

1949.

QUEENSLAND

FORTY-NINTH ANNUAL REPORT OF THE BUREAU
OF SUGAR EXPERIMENT STATIONS.

REPORT OF THE DIRECTOR

TO

THE HON. THE SECRETARY FOR AGRICULTURE AND STOCK

(As required by "The Sugar Experiment Stations Acts, 1900 to 1948").



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BY AUTHORITY: A. H. TUCKER, GOVERNMENT PRINTER,

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FORTY-NINTH ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS.

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK.

Dear Sir,—I have the honour to present the Forty-Ninth Annual Report of the Bureau of Sugar Experiment Stations, covering the period from 1st July, 1948, to 30th June, 1949.

NORMAN J. KING, Director.

16th September, 1949.

Director's Report.

General.

Little relief in the supply position was experienced during the period 1st July, 1948, to 30th June, 1949. Although, as pointed out in the last report, a large proportion of the standard sugar-mill machinery is manufactured in Australia, and the capacity to produce the requirements is adequate, the general scarcity of steel and similar products continued to delay the installation of much needed plant. Such other items as tramlines, cane trucks, and locomotives, which are of prime importance in an industry where some six million tons of raw material have to be handled, were also in extremely short supply and little hope is held out for the rapid amelioration of this position.

The 1949 crop, which has been estimated at 6,352,000 tons of cane, will be the second largest on record if correctly assessed. However, much depends on the severity of the winter and on whether the early spring conditions are conducive to further crop development. The incidence of frost in the south or of heavy arrowing in all districts could have a marked effect on the final figures. Should conditions be unfavourable to continued growth it is unlikely that the estimated production will be realised. The spring of 1948 was not propitious for early growth although it was admirably suitable for uninterrupted harvesting of the record crop. In the early summer extremely dry conditions prevailed, but the position was eased in late December, and from that time good rains were experienced. Prolonged wet seasons eventuated from Mossman to Ingham and flood conditions developed in March and April. Central and Southern districts also experienced good wet seasons though the precipitations were not above average. The abundance of soil moisture over an extended period from Mackay north resulted in record crop estimates, but unfortunately land preparation and planting were much delayed north of Townsville.

The large tonnage of cane available, combined with the desire to avoid extension of the crushing into 1950, influenced the starting dates of mills and the season began simultaneously at Babinda, Macknade, and Inkerman on May 25th. By the end of June 16 mills were in operation and it is anticipated that the remaining 17 will be functioning by the end of July. Even with such an early commencement of crushing it is expected that certain mills with large cane tonnages for harvest will be unable to terminate operations before the new year.

The credit for the very high cane tonnages of 1948 and 1949 cannot be given entirely to the favourable seasons experienced. These two years introduced a new era in sugar production in this State as they coincided with the harvesting on a large scale of three new varieties which have successfully supplanted some old favourites. During the years 1941 to 1947 when, as a result of poor seasons and the effects of wartime shortages, production was dropping alarmingly, Trojan, Q.28, and C.P.29/116 were being propagated on an ever increasing scale and their combined effect was not markedly apparent until 1948. The coincidence of a very favourable season enhanced their value but it is of importance to appreciate that the new canes took better advantage of the season, in terms of production, than their predecessors could have done.

The mills this year, in marked contrast to 1948, are starting the season with no carry-over stocks of sugar. All sugar ports were cleared during May or June with the exception of Lucinda Point, and only a very small tonnage remained at that port for shipment in July.

Estimate of the 1949 Crop.

During May, 1949, the usual preliminary assessment of the crop was made and it was revealed that approximately 6,600,000 tons of cane would be available for crushing. This has since been amended to 6,352,000 tons of cane and it is calculated that this amount would yield 882,000 tons of 94 n.t. sugar or 846,000 tons of bagged sugar. If attained, this production would fall short of that of 1948 by some 28,000 tons in terms of 94 n.t.

Although the season was not so favourable as in 1947-48, the period during which rains fell was one of excellent crop development and, in the north, the extension of the wet period into the winter months promoted considerable late growth. The central district figures are exceptionally high due to the very large plantings in 1948 of the variety Q.50, which appears to have conferred a new status of productive capacity on the Mackay soils.

In addition it is estimated that the three New South Wales mills will crush some 308,000 tons of cane, from which about 37,300 tons of bagged sugar may be expected. The estimated total production for 1949 may therefore be placed at 921,000 tons of 94 n.t. sugar.

In Table II. below are shown the individual Queensland mill estimates for 1949 as well as the actual crushings for 1948.

TABLE II.—SUGAR CANE HARVESTED, 1948—ESTIMATED, 1949.

Domestic Crushing.	Actual Crushing.		Mills.	Estimated 1949.
	Purchased.	Condemned.		
157,088	157,088	..	Mossman	145,000
244,449	244,449	..	Hambledon	230,000
293,157	293,157	..	Mulgrave	265,000
238,416	238,416	..	Babinda	240,000
204,228	204,228	..	Goondi	205,000
266,836	266,836	..	South Johnstone	250,000
182,528	182,528	..	Mourilyan	175,000
267,594	267,594	..	Tully	283,000
327,566	327,566	..	Victoria	323,000
296,221	296,221	..	Macknade	300,000
2,478,083	2,478,083	..		2,416,000
145,517	145,517	269	Invicta	110,000
226,262	225,941	12	Pioneer	234,000
241,225	241,106	..	Kalamia	238,000
291,906	292,346	111	Inkerman	325,000
904,910	904,910	392		907,000
257,388	257,420	190	Proserpine	220,000
91,678	91,644	14	Cattle Creek	102,000
258,050	258,122	..	Racecourse	255,000
244,681	244,629	..	Farleigh	250,000
102,856	102,826	..	North Eton	126,000
226,460	226,433	57	Marian	240,000
254,918	254,957	240	Pleystowe	289,000
231,148	231,148	29	Plane Creek	230,000
1,667,179	1,667,179	530		1,712,000
117,131	113,503	..	Qunaba	90,000
246,803	250,431	4	Millaquin	220,000
251,687	251,687	16	Bingera	220,000
262,085	262,085	31	Fairymead	210,000
66,091	66,091	5	Gin Gin	65,000
219,711	219,656	..	Isis	240,000
68,144	68,199	..	Maryborough	62,000
33,998	33,998	4	Mount Bauple	48,000
103,477	103,477	..	Moreton	142,000
14,257	14,257	5	Rocky Point	20,000
1,383,384	1,383,384	65		1,317,000
6,433,556*	6,433,556*	987		6,352,000

* Includes 55 Tons from Unassigned Land.

1948 Crop Statistics.

With a total crushing of 6,433,556 tons of cane in 1948 a new record was established for the State. The previous highest figure was in 1939, when just over six million tons were treated. As a direct result of the heavy crop the mill crushing periods began early in all cases and were extended beyond the end of the year in 12 factories. Fairymead and Pleystowe, which completed their crushings on the 27th and 28th January, 1949, respectively, were the last two to close down. The crushing periods varied from 13.3 weeks at Rocky Point to 32.9 weeks at Victoria, but the general extent of the period is gauged from the fact that 19 mills had crushing seasons in excess of 25 weeks and 11 of these were in operation for more than 28 weeks. Such extended seasons, continuing as they do into the period of next year's growth, are unfavourable to high sugar production, since the curve of maturity is well past the peak. In contrast with the previous year, when Mackay mills crushed for only 10 to 14 weeks, the eight mills in that district averaged over 25 weeks crushing period.

A certain amount of condemned cane—*i.e.*, cane below 7.0 c.c.s.—was delivered to some mills and this is shown in Table II. As previously pointed out, such cane is generally crushed before it is known that it is below the minimum sugar content allowed, but this tonnage is deducted from the figures used for calculation of mill performance.

The yield of sugar for the 1948 season, which includes 153 tons for local sales, was 910,049 at 94 net titre. This is also a new record of production and exceeds the 1947 production by 338,391 tons. For comparative purposes the previous record production in 1939 was 891,422 tons, including local sales. The tremendous increase recorded over 1947 was due in the main to a bounteous season in all centres of production. The quality ratio showed an improvement from 7.26 to 7.07 tons of cane required to make a ton of sugar, but this figure has been improved upon in several previous years. The best recorded ratio was in 1940 with a figure of 6.82.

Annual production of sugar in the areas north and south of Townsville is shown in Table III. The five-year period illustrates seasonal effects in these areas. Although both divisions were far in excess of the previous year's production the north of Townsville increase was only 39 per cent. as against 75 per cent. in the south of Townsville section. Most of this tonnage increase was produced in Mackay, which had suffered a serious drought prior to the previous crushing.

TABLE III.—SUGAR PRODUCTION (94 NET TITRE), 1943-1948.

Mills.	1943.	1944.	1945.	1946.	1947.	1948.†
North of Townsville	206,634	259,573	282,034	233,732	255,958	356,969
South of Townsville	279,813	383,967	362,627	278,354	315,700	553,080
Totals	486,447	643,540	644,661	512,086	571,658	910,049

† Tons 94 n.t. sugar includes "Local Sales."

The acreage harvested for milling, although amounting to 258,585, was still 7,153 acres below the record of 1940. A further 8,705 acres were harvested for plants throughout the State and some 1,449 acres were used for fodder. The distribution between plant, ratoon, and standover cane of the total area harvested for milling was as follows:—

District.	Plant.		Ratoons.		Standover.		Total.
	Acres.	Per Cent.	Acres.	Per Cent.	Acres.	Per Cent.	Acres.
Northern	40,001	39.89	60,143	59.98	133	.13	100,277
Burdekin	18,355	69.13	8,195	30.87	0	.00	26,550
Mackay	49,152	62.45	29,308	37.24	242	.31	78,702
Southern	19,519	36.79	25,734	48.50	7,803	14.71	53,056
Whole State	127,027	49.12	123,380	47.72	8,178	3.16	258,585

Further records were established for the production of both cane and sugar per acre. The average sugar cane yield was 24.88 tons per acre and the average sugar produced was 3.52 tons. These figures contrast with the 18.81 and 2.59 of the previous season. Previous record production per acre was in 1939 with figures for cane and sugar of 23.14 and 3.41 respectively. As is usual the Lower Burdekin area exceeded all others in both figures of production, and, for the first time, produced in excess of 5 tons of sugar per acre. When it is considered that the crop consists exclusively of one-year cane, this figure must compare favourably with the world's best. The Bundaberg-Gin Gin district was second in productive capacity, a result which was undoubtedly influenced greatly by C.P.29/116. The average yields of cane and sugar per acre, together with the tonnage crushed in the various districts, are set out in Table IV.

TABLE IV.—TOTALS AND AVERAGE YIELDS BY DISTRICTS, 1948 (DOMESTIC CRUSHING).

District.	Tons of Cane.	Tons Cane per Acre.	Tons 94 n.t. Sugar per Acre.
Mossman-Ingham	2,478,083	24.71	3.56
Lower Burdekin	904,910	34.08	5.14
Proserpine	257,388	24.38	3.46
Mackay	1,409,791	20.67	2.93
Bundaberg-Gin Gin	943,797	28.00	3.64
Childers-Maryborough	321,853	22.33	2.95
Nambour-Beenleigh	117,734	23.70	3.01
	6,433,556	24.88	3.52

The usual production data for cane, sugar, and acreage are shown in Table V. The figures show clearly the recovery which has taken place since the war in general production and per acre performance.

TABLE V.—ACRES CULTIVATED AND HARVESTED, YIELDS OF CANE AND SUGAR, AND ACRE YIELDS AND QUALITY OF CANE, 1939-1948.

Year.	Acres Cultivated.*	Acres Harvested for Milling.	Total Yields.		Yields per Acre.		Tons Cane per Ton 94 n.t. Sugar.
			Cane.	Sugar.	Cane.	Sugar.	
			Tons.	Tons.	Tons.	Tons.	
1939	353,996	261,047	6,038,821	891,422	23.14	3.41	6.77
1940	350,851	265,738	5,180,756	759,446	19.50	2.86	6.82
1941	334,787	246,939	4,793,589	697,345	19.41	2.82	6.87
1942	316,798	238,213	4,350,642	605,680	18.26	2.54	7.18
1943	326,478	228,895	3,397,424	486,747	14.84	2.12	6.98
1944	317,386	222,215	4,398,190	643,540	19.79	2.90	6.83
1945	326,247	239,826	4,551,982	644,661	18.98	2.69	7.06
1946	317,766	228,395	3,714,475	512,086	16.26	2.24	7.25
1947	332,516	220,649	4,150,987	571,658	18.81	2.59	7.26
1948	384,213	258,585	6,433,556	†910,049	24.88	3.52	7.07
Averages for 10 Years ..	336,104	241,050	4,701,042	672,263	19.49	2.79	6.99

* Data Supplied by Government Statistician.

† Tons 94 n.t. Sugar includes "Local Sales."

The amount of molasses disposed of during the 1948 season was exceptionally high, but the figure shown in the following table should not be confused with that produced, since stocks are carried over each year. It is pleasing to note that the amount used for fertilizer has increased considerably.

TABLE VI.—DETAILS OF DISPOSAL OF MOLASSES FOR 10-YEAR PERIOD, 1939-1948.
(DATA SUPPLIED BY THE GOVERNMENT STATISTICIAN.)

Method of Usage.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.
	Gallons of Molasses :—									
Distilleries	9,581,241	11,531,396	12,882,397	10,457,747	7,345,596	9,136,862	9,380,679	10,691,581	8,256,892	18,233,153
Fertiliser	4,295,289	3,334,372	1,510,650	1,857,300	2,122,220	2,745,617	3,074,755	2,899,167	3,558,155	5,282,501
Stock Feed	4,727,170	5,380,242	3,490,937	3,071,918	3,055,728	4,719,517	4,675,909	6,932,902	5,320,970	5,845,585
Mill Fuel	3,834,653	1,781,425	1,232,388	3,024,370	2,176,926	2,251,737	1,748,299	954,970	1,427,775	1,677,174
* Ferment										377,939
Other Purposes	188,889	228,450	158,821	303,240	441,522	254,358	423,085	241,045	312,930	24,546
Wasted	457,541	47,069	55,237	31,153	97,643	16,660	50,902	63,466	15,035	167,537
Totals	23,084,783	22,302,954	19,330,380	18,745,728	15,239,635	19,124,751	19,353,629	21,783,131	18,891,757	31,608,435

* In previous years, Molasses used for making cleaning ferments was included under heading "Other Purposes."

Sugar Values, 1948 Season.

The Sugar Board has declared the final price for the 1948 season's sugar as follows :—

	No. 1 Pool.			No. 2 Pool.	Total.
	Home Consumption.	Surplus.	Total.	Excess.	
Tons	469,081	260,456	729,537	180,358	909,895
Per cent.	64.2984	35.7016	100	..	..
Price	£23 ls. 0d.	£28 2s. 0d.	£24 17s. 0d.	..	£25 9s. 11d.

In addition, the values for the New South Wales production were :—

	Home Consumption.	Surplus.	Total.
Tons	30,740	2,258	32,998
Per cent.	93.1577	6.8423	100
Price	£23 1s. 0d.	£28 2s. 0d.	£23 7s. 11d.

Calculations from these figures show that the value of the Queensland crop advanced steeply to £23,200,000, which is far in excess of any previous income to the industry. The total value does not bear any direct relation to production as the principal factor influencing the average overall price was the high return received for the exportable surplus. In 1939, when the tonnage of sugar produced was little below that of 1948, the total value of the crop was just over £14,000,000, the major difference being that export sugar was sold in that year for £10 7s. 6d. per ton whereas in the season under review the export price was £28 2s.

The following table summarizes production and consumption figures and sugar values for the past ten years. The revised Mill Peak Schedule first operated in 1939 :—

Year.	Total Sugar Production at 94 n.t.	Tons Sugar Exported 94 n.t.	Average Australian Price.	Average Export Price.	Average Price No. 1 Pool Sugar.	Average Price all Sugar.	Total Value.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
1939	891,218	531,033	23 12 6	10 7 6	16 19 7	15 15 3	14,046,500
1940	758,966	383,699	23 1 0	11 5 6	17 11 9	17 2 8	13,003,600
1941	696,927	281,275	22 13 0	10 18 9	18 0 4	18 0 2	12,550,500
1942	605,361	188,080	22 14 6	10 16 3	19 1 0	19 0 6	11,516,000
1943	486,354	75,650	22 10 6	13 2 6	21 1 3	21 1 3	10,244,000
1944	643,475	208,679	22 2 0	15 0 6	19 18 1	19 16 1	12,744,000
1945	644,624	205,453	21 18 0	16 17 9	20 8 2	20 6 1	13,087,000
1946	512,035	72,578	21 18 0	21 10 0	21 16 11	21 16 10	11,184,000
1947	571,503	95,246	24 0 0	29 12 6	24 16 0	24 18 9	14,251,000
1948	909,896	440,814	23 1 0	28 2 0	24 17 0	25 9 11	23,198,000

Review of the Industry.

The production of a record cane and sugar tonnage in the 1948 season confirmed the optimism expressed in the last report as to the future of sugar production in the State. A very favourable year in most areas was mainly responsible for this performance, but at the same time there were various other factors operating which did not allow the maximum benefit to accrue from the propitious climatic conditions. Fertilizer was not in full supply, the field labour was short of demand and full advantage had not yet been taken of the new varieties which have shown their superiority over the old standards in all districts. The capacity of existing assigned lands to produce is capable of further exploitation with the better use of newer varieties, and in future years, climatically as favourable as 1948, production can reasonably be expected to exceed previous records.

Sugar removals.—The efforts made by representatives of the industry in 1948 to have sugar removals speeded up met with a great deal of success. As reported last year a record amount of sugar was in store at the end of the year and the industry was alarmed at the prospect of starting the 1949 crushing with storage space still partly occupied. During the first half of 1949, however, a concentration of sugar ships made rapid inroads on the stored supplies, and at the start of the crushing in May, 1949, all sugar had been cleared with the exception of some 9,000 tons. When it is remembered that the 1948 season was one of record sugar production the performance must be considered a very praiseworthy one and the industry benefited by starting the 1949 crushing with, in most cases, empty storage.

Expansion of the Industry.—During September, 1948, the Premier of Queensland discussed with the British Ministry for Food certain proposals for the stepping up of Australian sugar exports to 500,000 tons. During the same month a statement was made by Dr. Edith Summerskill, who announced in Parliament that Britain would guarantee sugar producers in Australia, South Africa, and the Colonies an outlet for exportable surplus sugar for the next five years. This assurance covered crops from 1948 to 1952, but no price guarantee was given and it was stated that prices, unless otherwise agreed, would be negotiated annually. An existing undertaking covered the exportable surplus of the 1949 crop, so the announcement, in fact, extended this for a further three years. This assurance was most welcome to the local industry, but in the absence of a long-term price guarantee the industry is somewhat diffident regarding proposals for extensive capital outlay to expand production appreciably.

Expansion of the Peak Sugar Quota.—Probably the most important and far-reaching event during the year was the decision of the State Government to approve the increase of aggregate mill sugar peaks by 187,000 tons of 94 n.t. sugar.

The mill peaks which had been established by the Central Cane Prices Board in 1939 were thus increased to a new aggregate peak of 874,000 tons, and with similar adjustments for New South Wales, bringing that State's peak to 55,000 tons, a new peak ceiling of 929,000 tons of 94 n.t. sugar is provided for. This figure for Australian production should, on the evidence submitted this year, conform to present requirements on the home and export markets and should have a marked influence in stabilizing industry economy.

The further provision made by the Central Board to allocate a certain proportion of the increase for new or increased assignments allows for desirable expansion in certain areas and for increased settlement in proximity to existing mill transport systems.

Throughout the industry a considerable degree of satisfaction was expressed regarding the Central Board findings and the Government's decision to implement them. The altered circumstances in many districts during the previous ten years had obviously received serious consideration, and major changes brought about over the same period by the expansion of irrigation and the development of superior varieties doubtless played a major part in the calculation of the new peaks. During that period the industry witnessed extensive varietal changes which were without parallel in any previous decade and the relative producing potentialities of many districts were vitally affected by the amazingly rapid development of Trojan, Q.28, Q50, and C.P. 29/116.

The International Sugar Agreement.—During August, 1948, a meeting of the Sugar Council held in London discussed the drawing up of a new International Sugar Agreement which was strongly advocated by Cuba as a consequence of that country's record outturns in 1947 and 1948. The Council, however, decided to extend the present Agreement for another year and to appoint a committee to study the changes in the world sugar situation. Successive Protocols renewing the Sugar Agreement of 1937 provided for revision of the Agreement when the time appeared opportune, the recognized procedure for revision being that the signatory Governments acknowledge that revision is necessary and that the existing Agreement should be taken as the starting point in any such revision.

The quota provisions of the International Sugar Agreement were inoperative during the war and since, but the Agreement has been extended each year as it was generally considered to be an important basis for the negotiation of any future agreement. There are signs that a crisis may develop in exporting countries within a few years, but this does not necessarily imply that world production will satisfy consumers' demand within that period. There has admittedly been a considerable increase in production, but the demand is being restricted by a scarcity of hard currencies in the principal European importing countries. On the other hand, an increased demand has developed and should continue to develop in countries with large coloured populations where higher postwar wages are providing greater purchasing power.

Although increased world population figures must, in a broad sense, be taken into consideration in assessing potential demand for sugar, the issue is considerably clouded by political and economic factors. The present situation is complicated by currency problems and this explains why certain large importing countries are unable to provide currency to purchase in dollar markets. For the time being Australian producers have a measure of safety and security by reason of preferential entry to the British market but returns from this source could be influenced by sugar surpluses in dollar-producing countries, which would have an effect on the general level of world sugar prices.

Sugar Prices.—The sharply rising costs associated with sugar production during the past few years are a subject of considerable concern to the industry. Recognition of the effect this factor was having on industry economy was given in December, 1947, when the home consumption price was increased by the equivalent of $\frac{1}{2}$ d. per lb. retail or £4 13s. 4d. per ton. The producers would have received £3 16s. of this amount had costs remained constant, but since that date considerable rises have occurred in shipping freights, jute, coal, and wages. As a net result of these rising costs the industry will receive for the 1948 season's output only £1 15s. per ton on its home consumption raws. The prospects for the 1949 season are even less bright since the Sugar Board has advised that its expenses were expected to rise again, sharply, in the coming twelve months due to continued and heavy increase in jute costs, waterfront and sea transport expenses, refining and delivering, coal prices, &c. During this period the increased price granted to the producer in December, 1947, is likely to be completely absorbed by increased charges outside its control. Security within the industry was achieved in 1948 by the buoyant overseas price obtained for export sugar, but even this figure was £1 10s. per ton below that of 1947 and must be taken as an indication that Britain will endeavour to buy more cheaply as the supply position eases. The price will be examined annually and will doubtless take into consideration market trends in countries outside the Empire, which, in turn, are a reflection of the world supply-demand balance. A case, based on the altered circumstances within the Australian consumption price structure, has been submitted by the sugar organisations to the Queensland Government which, it is understood, will support an application for a further price increase to the Commonwealth.

War Service Land Settlement.—Settlement of eligible persons under the three categories of "The War Service (Sugar Industry) Land Settlement Act of 1946" proceeded during the year and a good proportion of the allotted lands have now been settled and are in part production. Assignments approved in Category 1 (landless men) total 156, and already 48 of these have been ballotted for, while further ballots are pending. In the second category, confined to landholders and option holders, 108 new assignments were granted and in the third section covering increased assignments 118 returned servicemen have been granted additional assigned acreage. Farm peaks have been increased in the cases of 19 applicants.

Considerable difficulty was encountered in obtaining sufficient land in some mill areas for settlement of the quota of landless applicants up to the required number. The problem in some areas, where suitable land in reasonable proximity to existing transport does not exist in quantity, is still acute, but examination of further parcels of land is still proceeding.

Mechanical Harvesting.—The interest in mechanising the harvesting of the cane crop became intensified during the war years when a short-supplied labour market accentuated manual harvesting problems. Within the past year or so, however, despite a more favourable labour supply, there is no waning, but a distinctly greater interest in the subject. The Mechanical Harvesting Committee has sponsored the development and manufacture of the Kinnear machine, and trials with this during the present season are extremely favourable. In other centres the emphasis is being placed on cheap tractor attachments for cutting down but not topping the cane, the aim being to supply small growers, who normally harvest their own allotment, with a labour-saving device. In the Central district the most favoured type is the Maloney, which harvests and tops but does not bundle, while on larger properties throughout the State the Fairymead harvester, now in commercial production, fulfils the requirements of harvesting and bundling large tonnages. Mechanical loaders are not being concentrated upon to the same extent, although the Committee is still proceeding with the improvements to the Fowler loader. This healthy interest in harvest mechanisation will undoubtedly result in several different types being utilised to cope with the varying field and transport conditions.

Manpower and Immigration.—The field and mill labour position continued to show improvement during the year under review, but labour supply is still not comparable with pre-war years. Professional cutters employed on the harvest reached a peak of 6,278 during the 1948 season compared with 5,500 in 1947, and at the end of July, 1949, the number employed was 6,252. The use of Balt immigrants was very successful in the 1948 season and this labour source is again being drawn upon in 1949, some 770 being in employment as canecutters at the time of writing. In the mills the labour problem is also less acute than for several years. Full shifts were operated by all mills in 1948, although the same degree of permanency does not obtain. There is a percentage of "tourist" workers who move from mill to mill throughout the season.

Fertilizer.—As a result of representations being maintained throughout the year, one-third more sulphate of ammonia was supplied for use in the cultivation of cane than during the preceding corresponding period, and sales amounted to slightly more than that available during 1946-47. It is pleasing to note that due to strenuous efforts the State's quota for sulphate of ammonia has been raised from 46.6 per cent. to 50 per cent. of the supply available for use in Australia. International control of sulphate of ammonia was relinquished in June, which is an indication of an easier supply position for the future, but any interruption in the supply of coal will seriously jeopardise the possibility of a continuance of supplies.

An extension to the Queensland superphosphate factory will enable the supply to keep equal to the demand. Meatworks fertilizers are still very short and no alleviation of the position seems possible as supply is related to cattle killings and demand for meat and bone meals for stock food. The supply of potash has been equal to the demand and no qualms are felt as to the future of this fertilizer.

Sugar Factory Performance.—Considerable improvements in factory work were evident as a result of the year's operations. These were due in part to improved cane supply consequent upon the more satisfactory field labour position and also to the amount of improved equipment installed in mills since the previous season. In particular, the overall crushing rate showed a decided advance on past years. As some indication of general factory performance some pertinent figures are given in the following table for the past three seasons. In all respects appreciable improvement is shown in the 1948 season. For purposes of comparison some pre-war average figures are also shown.

	1948.	1947.	1946.	Approximate Averages 1937-1940.
Overall Recovery	85.61	84.37	82.57	87.5
Overall Recovery E.S.G.	85.31	84.04	82.24	87.1
Boiling House Efficiency	94.40	92.66	93.42	96.3
Boiling House Efficiency E.S.G.	94.07	92.34	93.05	95.9
Coefficient of Work	97.56	95.44	96.84	..
Coefficient of Work E.S.G.	92.63	90.56	91.89	..

Work of the Bureau.

After several years of rapid staff changes it is pleasing to report that in the year under review losses were numerically small and several new appointments were made. The Senior Entomologist at Mackay, Dr. W. A. McDougall transferred to the Science Branch, Department of Agriculture, and the Adviser in Cane Culture at Gordonvale, Mr. R. A. Abbott, resigned from the Bureau staff following his success in drawing a soldiers' settlement block. Additions to the staff were Mr. G. Bieske as Analyst, Mr. W. R. Stern as Assistant Agronomist, and Mr. J. H. Barrett as Cadet. Mr. A. G. Claire, now in the final year of the Applied Science at the University, has been awarded a scholarship by the Government and will take up duties with the Mill Technology Division at the end of the year. A further addition to this Division was the recent appointment of Mr. A. Doolan as Technical Assistant. On the clerical side Misses J. B. Denham and J. F. Jones, Clerk-Typistes, have been replaced by Misses M. L. Challenor and K. M. Carroll.

The Assistant Director (Mr. L. G. Vallance) returned from overseas in December after an absence of approximately six months visiting Ceylon, Egypt, England, the West Indies, United States, and Hawaii. Organisations carrying out research in soil deterioration and maintenance of fertility were consulted and considerable information of interest and value to the sugar industry were obtained. Since his return Mr. Vallance has delivered a series of lectures to growers and millers in practically all sugar-producing districts, and these were accompanied by moving and still pictures to illustrate cultivation methods used in other countries. Research work in applying some of the information to Queensland soil problems is already under way.

The Division of Soils and Agriculture continued its expanded programme of field trials and investigations during the year. Fertility surveys at Fishery Falls, Mourilyan, Proserpine, North Isis, and Mount Bauple gave valuable information on the soil fertility status. It was of interest to note that the available plant food levels in these soils have changed, probably as a result of unbalanced fertilization during the war years. Phosphate content is now, in general, good to fair whereas potash is mostly poor. The series of lime trials reported on last year again gave valuable results in the first ratoon crop. Of 42 trials harvested 37 gave beneficial responses in either the plant or ratoon crop while 25 gave gains in both crops. The average increase of 3.2 tons of cane per acre could amount to a very large tonnage of cane in the aggregate if lime were applied intelligently to all of the acid soils in these areas.

A series of nitrogen trials laid down in 1947 was also harvested during the year. These had been designed to assess the need for using high nitrogen mixtures at planting time. Sugar Bureau fertilizer mixtures contain only small percentages of nitrogen and it is recommended that, in the absence of a green manure fallow prior to planting, a top dressing of sulphate of ammonia be applied at a time, some months later, when the plant can most effectively use it. The 39 trials harvested, ranging from Mossman to Bundaberg, gave unmistakable evidence that no advantage accrued from the nitrogen application at planting time. It can therefore be concluded that the low nitrogen in Sugar Bureau planting mixtures is based on sound reasoning.

Minor elements again failed to give positive results on sugar-producing soils, and the suspected copper and zinc deficiency on some poor sandy country in the Moreton area has not been definitely confirmed. A larger and more even tract of this "droopy top" affection has been located this year and the opportunity for replicated treatment on a plot scale has been taken. Previous known occurrences of "droopy top" were small and scattered and did not lend themselves to trial treatments. Despite negative results so far obtained in minor element work several more trials have been laid down on the sandy and gravelly, highly leached soils in the high rainfall belt.

Further successful studies of the effects of hormone-type weedicides were made during the year, the emphasis being placed on the pre-emergence effects of a 2 : 4 dichlorophenoxyacetic acid and its derivatives and on a general purpose herbicide formulated by the Bureau from diesel oil emulsion, sodium pentachlorophenate and 2 : 4D. The success of these applications on a small scale led to the designing and manufacture of a boom spray attachment for a tractor for further work under field conditions. Considerable reductions in cost of these materials since the last report bring them within the bounds of economical usage.

The Mill Technology staff conducted tests at Inkerman and Pleystowe mills on two vacuum pans of novel design and also studied the work of the Werkspoor crystallizer at Moreton Mill. Both series of tests were designed to provide information which might assist mills in choosing new equipment for handling low-grade massecuite. In addition investigations were carried out into the method used by Isis mill for storing juice over week-ends. In the slack-season period emphasis was placed on attention to the pilot wax plant and to the ironing out of several weaknesses in the design.

Further work on green manure crops was conducted in all districts. The velvet beans again produced excellent crops under a variety of conditions and the drought resistance of these varieties was confirmed. Reeves' Selection and Cristaudo Pea once more demonstrated their

resistance to "wilt" and succeeded in growing well under waterlogged conditions. Seed supplies are still difficult to obtain, but it is hoped that the market will see commercial quantities during the coming summer. It is felt that the requirements of Queensland canegrowers are adequately provided for with Poona pea, Giant cowpea, velvet beans, Reeves' Selection, and Cristaudo pea for summer-growing cover crops. These five legumes constitute a group from which can be selected a suitable type for any conditions, including dry and over-wet localities.

In the Burdekin area the development of the new Sugar Experiment Station has been delayed by general shortage of materials, the principal difficulties being associated with fencing materials, electric motors for the irrigation unit, and buildings. It is hoped that land can be prepared and initial cane plantings made in April or May of 1950, but this will naturally be contingent upon the pumping unit being in operation at that time.

Although seedling production proceeded as usual on all stations certain changes in procedure were introduced to improve the type of seedlings being bred and to facilitate as far as possible their propagation in the various districts. In particular in North Queensland much less emphasis is being placed on breeding from noble canes and a greater bias has been given to seedlings with proportions of wild blood. Early maturing types are the principal aim of the plant breeder since this characteristic has assumed even greater importance with the larger crops being grown and the resultant longer crushing seasons. The seedling substations at Bartle Frere and Lansdowne road, Mackay, continued to function and provision has been made for seedling introductions into isolation at Beerwah to provide a greater supply of cane for the Moreton area. It has been felt for some time that the climatic conditions at Nambour were so different from those of Bundaberg that selections at the latter centre were not necessarily suitable types for the Nambour environment.

Further changes of some magnitude and of considerable interest took place in the varietal composition of the crop. The decline of Badila to a mere 18.7 per cent. marks what is probably the final year of a long reign as unchallenged leader. The rise of Trojan, Q.28, and C.P. 29/116 to between 12.8 and 16.4 per cent. of the total crop provides an interesting line up of Northern, Central, and Southern district favourites. Queensland-bred varieties rose to 53.5 per cent. of the crop, the principal components of this total being Trojan, Q.28, Q.44, H.Q. 426, Eros, Q.49, and S.J.16. Q.50, which will be a strong contender for a high place in the list within two years, comprised only 1.4 per cent. of the 1948 crop.

The general disease position in the State showed certain improvements during the year but these were offset by a couple of disturbing discoveries. Early in the year an attempt was made to completely eradicate downy mildew in the last remaining stronghold of this once major disease. Restrictions were placed on the planting of P.O.J.2878 in the Woongarra area at Bundaberg and so successful was this measure and so widespread have become the plantings of the resistant C.P.29/116 that in the twelve months only 74 stools of downy mildew were found.

Similar restrictions on the planting of P.O.J.2878 at Bingera and in the Moreton area for Fiji disease control also resulted in a marked improvement in the disease position. The planting of extensive areas of Q.47, Q.49, C.P.29/116 and to a lesser extent Vesta and Trojan, is contributing in no small measure to the control in these areas.

The discovery of an outbreak of downy mildew in the Hambledon area during the summer was a rude surprise. No downy mildew had been seen in this area since 1943 and no explanation of the new outbreak can be provided, although the possibility of a carry-over in some alternate host plant cannot be discounted. Inspections and roguing quickly brought the outbreak under control and certain restrictions were imposed on the use of planting material and on the use of susceptible varieties within a half-mile radius of the occurrence. The very high proportion of susceptible varieties now being grown in that area makes it essential that very rigid precautions be continued to prevent further outbreaks or an extension of the existing one.

Although at Mackay the pathologist investigating the Q.28 trouble was able to demonstrate the cause of the ratoon stunting, it was disturbing to learn that a transmissible disease of a new type was responsible. The absence of visible disease symptoms makes identification of healthy and clean plants exceptionally difficult, and inspectors can be guided only by past history of blocks and can confine themselves only to apparently normal ratoon cane. The masking of the ratoon-stunting symptoms under very good or irrigated conditions does not tend to mitigate the difficulty of control. A comprehensive programme of research into this disease is now under way.

A considerable expansion of mercurial dipping of cane setts took place in the Inkerman area during the year. Farm plants capable of treating some 20 tons of cane setts per day are being made locally and growers who have experienced bad germinations as a result of pineapple disease are taking full advantage of this economic and successful method of control.

There was a marked increase in grey-back grub infestations in the far north and also in the Lower Burdekin and Mackay areas. Beetle flights were heavier and the subsequent climatic conditions favoured egg survival. However, overall losses of cane were far below those of previous outbreak years owing to the widespread application of "Gammexane" in areas where grub infestation was anticipated. Some 7,000 acres were dressed with this insecticide and more would have been used had the supply position permitted. There is now no question regarding the efficacy of this control measure, and trials have demonstrated conclusively that 150 lb. of 10 per cent.

dust per acre has sufficient residual effect to ensure freedom from damage over the plant and two ratoon crops. It is interesting to record that the first experimental trials with "Gammexane" were laid down in 1945 and the treatment of 7,000 acres three years later is a clear-cut indication of the manner in which the canegrowers in grub-infested areas have adopted the treatment. No single agricultural advance in the industry in the past decade can compare with this control of our major cane pest. Bureau entomologists have concentrated their efforts on working out details of the control during the past four years and this work is still proceeding in relation to Frenchi grubs and other two-year cycle types.

The second ranking pest in cane fields, the wireworm, has been equally well controlled by the use of 20 lb. of 10 per cent. benzene hexachloride dust per acre mixed with 3 cwt. of the appropriate fertilizer. Although placed in partial contact with the cane setts no depressing effects on germination or ultimate crop yields were noted in a large number of trials. The adoption of this control measure on some 3,000 acres of wireworm-infested land in Mackay demonstrates the success of this practice, and the confidence of the growers in its effectiveness.

Annual Field Days were held at the three Experiment Stations during April and May, when a total of approximately 1,250 growers attended the function. The Annual Pest Board Conference was convened at Mackay in April and Bureau Staff also attended the Conference of the Queensland Society of Sugar Cane Technologists. A conference of Bureau agricultural staff was held at the same time for the formulation and discussion of the field work programme.

Publications by Bureau Staff.—

Officers of the Bureau staff made the following contributions to technical sugar literature during the year :—

Proceedings of the Queensland Society of Sugar Cane Technologists.

Brain, L. R.—The Werkspoor Crystallizer at Moreton Mill.

Buzacott, J. H.—*Anoplognathus boisduvali* Boisd. as a Pest of Sugar Cane.

Buzacott, J. H.—Recent Varietal History and Seedling Programme for the Mackay District.

Elliott, J. T. and Pembroke, E. A.—History of Sugar in the Mackay District.

Nicklin, J. H.—Turbo-Alternators in Sugar Factories.

Smith, N. McD.—South Maroochy Swamp Drainage Scheme.

Story, C. G.—Land Drainage in Mackay Canefields.

Venton, C. B.—A Comparative study of Some New Vacuum Pans.

In addition the following publications were issued by the Bureau :—

Technical Communication 1949 No. 1. Irrigation Waters of the Bundaberg Area, by Norman J. King.

Farm Bulletin No. 10. Green manuring and Soil Organic Matter, by Norman J. King.

An Investigation into the Rat Pest Problem in Queensland Canefields : 6. Controls and Conclusions, by W. A. McDougall.

Investigations in the Control of Wireworm (*Lacon variabilis* Cand.) in Canefields with "Gammexane," by W. A. McDougall.

Four issues of the Quarterly Bulletin and five issues of the Newsletter were published.

The Bureau levy for the 1947 season was two pence per ton of cane. Receipts and disbursements for the year under review and totals since the inception of the Sugar Fund in 1900 are shown in Appendix I., whilst for the benefit of readers outside the Queensland sugar industry the derivation of the C.C.S. formula is given in Appendix II.

APPENDIX I.

"The Sugar Experiment Stations Acts, 1900 to 1948."

SUGAR FUND.

STATEMENT OF RECEIPTS AND DISBURSEMENTS FROM 1ST JULY, 1948, TO 30TH JUNE, 1949.

RECEIPTS.				DISBURSEMENTS.			
		£	s. d.			£	s. d.
To Balance		11,252	17 3	By Salaries		21,864	11 9
„ Assessments		53,613	17 0	„ Contingencies		12,068	15 1
„ Endowment		7,000	0 0	„ Bundaberg Contingencies		2,860	8 8
„ Bundaberg		2,148	15 11	„ Mackay Contingencies		4,002	1 9
„ Mackay		2,344	11 1	„ Meringa Contingencies		4,554	17 6
„ Meringa		1,322	5 8	„ Lower Burdekin Contingencies		371	4 7
„ Sundries		349	18 1	„ Balance		32,310	5 8
		£78,032	5 0			£78,032	5 0

STATEMENT OF RECEIPTS AND DISBURSEMENTS FROM INCEPTION OF FUND, 1ST DECEMBER, 1900, TO 30TH JUNE, 1949.

RECEIPTS.				DISBURSEMENTS.			
		£	s. d.			£	s. d.
To Assessments	..	426,057	15 3	By Disbursements	..	746,009	18 2
„ Endowment	..	267,862	3 0	„ Balance	..	32,310	5 8
„ Sugar Experiment Stations ..	..	84,400	5 7				
		<u>£778,320</u>	<u>3 10</u>			<u>£778,320</u>	<u>3 10</u>

APPENDIX II.

C.C.S. FORMULA.

$$\text{C.C.S. in cane} = \text{Pol in cane} - \frac{\text{Soluble impurities in cane}}{2}$$

In practice, per cent. C.C.S. is calculated by the empirical formula—

$$\text{C.C.S.} = \frac{3P}{2} \left(1 - \frac{5 + F}{100} \right) - \frac{B}{2} \left(1 - \frac{3 + F}{100} \right)$$

where—

- P = pol in first expressed juice.
- B = brix in first expressed juice.
- F = fibre in cane.

Division of Soils and Agriculture.

Soil Technology and Experiment Stations Report.

(By L. G. VALLANCE, Assistant Director.)

Analytical Work.

The following is a summary of the analytical work performed at the Brisbane Laboratory for the period 1st July, 1948, to 30th June, 1949 :—

Soils.										No. of Samples.
Soil fertility surveys	..	..	..	..	..	..	..	..	..	224
Farmers' samples	..	..	..	..	..	..	..	..	..	334
Fertilizer trials	..	..	..	..	..	..	..	..	..	29
Lime trials	..	..	..	..	..	..	..	..	..	480
Miscellaneous.										
Water samples	..	..	..	..	..	..	..	..	..	24
Mill by-products	..	..	..	..	..	..	..	..	..	8
Other samples	..	..	..	..	..	..	..	..	..	18
Total	..	..	..	..	..	..	..	..	..	1,117

Fertilizer Trials.

A summary of the year's results indicates not only the value of fertilizer applications but stresses the necessity for using the correct type of fertilizer. In assessing the results, emphasis has been placed upon the amount of sugar per acre rather than the increase in tons of cane grown. An incorrectly balanced mixture may cause an appreciable increase in cane tonnage without the necessary increased production of sugar.

Standard factorial fertilizer trials were harvested on farmers' properties in the Gordonvale, Ayr, Mackay, and Maroochy River districts, the results of which will help to define more closely the fertilizer requirements of these particular areas. The results of the trial at Ayr are of interest in view of a recent soil fertility survey carried out in the Lower Burdekin. This survey showed that in spite of fertilizer shortages and many years of cultivation to sugar cane, these soils are still, in general, well supplied with phosphate and potash. This was reflected in the yield figures of the trial, which indicated that the application of nitrogen only was necessary.

The third and final ratoon crop of a combined lime plus fertilizer trial was harvested at Gordonvale. The figures show that a single dressing of lime plus the annual fertilizer application resulted in a total increase of practically 5 tons of sugar per acre over the three ratoon crops. This is a profitable return for the purchase of 18 cwt. of fertilizer and 2 tons of agricultural lime.

Nitrogen Requirement at Planting.

Based on experimental work and observations over many years, Bureau fertilizer recommendations have always made a point of the fact that less nitrogen is required in the fertilizer mixture used at planting than in the one used at ratooning. However, since sugar soils have now been cultivated continuously to cane for a large number of years, and because there have been many recent changes to more vigorously growing varieties, it was thought advisable to determine whether there had been any change in the nitrogen requirements of the plant crop as far as early application was concerned.

A series of trials was therefore laid down in all the main districts in which the normal planting mixture containing 1.25 per cent. nitrogen was compared with a special mixture containing 6 per cent. nitrogen. Phosphate and potash applications were maintained at a constant level. The normal top dressing of ammonium sulphate was given. The harvest figures of the 39 trials completed, ranging from Mossman to Bundaberg, showed clearly that no advantage was obtained by using the higher nitrogen and more costly mixture at planting. It may therefore be assumed that the reasons which prompted the use of approximately 1½ per cent. nitrogen in the Sugar Bureau plant mixtures are still valid.

Lime Trials.

The first ratoon crops of 42 lime trials were harvested during the year. As in the case of the plant crops, there was again a response to the application of lime in the majority of cases. A beneficial effect was obtained on 37 farms either in the plant or ratoon crop, and, of these, 25 showed a response in both crops. As predicted in last year's annual report, the increase in the ratoon crop (average increase = 3.2 tons cane per acre) was greater than the average increase in the plant crop (2.2 tons cane per acre).

A considerable amount of analytical work has been carried out, and is still proceeding on soil samples taken from the individual plots of these lime trials. The results to date are most interesting and the indications are that the crop response to lime is much more closely correlated with the calcium and magnesium content of the soil than with actual pH. This would suggest that the highly leached acid sugar soils are becoming deficient in these substances and the beneficial effect of lime is due to its value as a plant food and not to its power to correct acidity. If this is true it is a most important point in the management of these soils and the results of the analytical work now in hand are awaited with interest.

Fertility Surveys.

The soil fertility survey work was continued and some 68 farms in the following districts were surveyed :—Fishery Falls, Mourilyan, Proserpine, North Isis, and Mount Bauple. Soil samples were taken from plant cane blocks on each property. These have been analysed and the growers concerned have been advised of the results, together with the requisite fertilizer and liming recommendations. In addition 511 similar recommendations were forwarded to farmers in the Tully area as a result of the soil analytical work carried out in the Tully mill laboratory. The following table indicates the general fertility trend in the surveyed areas.

TABLE I.—SHOWING PERCENTAGE OF SOIL SAMPLES AT EACH FERTILITY LEVEL.

District.	Phosphate.			Potash.			Number. Samples.
	Low.	Fair.	Good.	Low.	Fair.	Good.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Fishery Falls	7	16	77	64	22	47	31
Mourilyan	7	14	79	72	26	2	43
Proserpine	18	19	63	88	10	2	51
North Isis	5	36	59	15	41	44	39
Mount Bauple	..	25	75	62	38	..	16
Tully	31	22	47	65	26	9	511
Total	25	22	53	64	26	10	691

The figures are interesting in view of the indication that potash appears to be replacing phosphate as the major plant food requirement. Possibly this is a reflection of the use of high phosphatic fertilizers over many years.

Soil fertility surveys were first instituted in 1940 and, although the work was curtailed during the war years, some 24 surveys have now been completed. The results obtained have been of considerable value in providing a systematic evaluation of the fertilizer requirements of the areas surveyed. Many growers have been enabled to carry out a more efficient fertilizing programme since they have been advised, not only of the correct type of fertilizer necessary, but also of the amounts required per acre. Such information has been particularly valuable during the recent shortages of fertilizer and has also brought about a more economic use of this high priced commodity. This work will be continued, although, at the moment, it is unfortunately not possible to increase the number of areas surveyed each year. The co-operation of Tully Mill in carrying out a large number of soil analyses is particularly appreciated and growers in that area have benefited considerably by the enterprise of the mill staff in this regard.

Potash Trial.

This trial was set out on all three experiment stations in order to determine whether late applications of potash as a top dressing would have any effect on the maturity or the final c.c.s. of cane at harvesting. A 5 x 5 Latin Square design was used and the planting was carried out in the autumn at Meringa and the spring at Mackay and Bundaberg. All plots received an application of potash at planting but the times at which the top dressings were applied were varied—i.e., December, March, April, and June of the year following planting.

Maturity testing of the variously treated plots was commenced in June immediately after the last plot had received its top dressing and carried out regularly during July, August, September, and October. The results indicated that the varying times of top dressing with potash had no effect on maturity or final c.c.s. content.

Soil Structure Investigations.

The maintenance of a favourable structure in cultivated soils is a major factor in preventing fertility deterioration under conditions of continuous cultivation. A considerable amount of laboratory work has been carried out on the measurement of the structural aggregates of various sugar soils with a view to measuring the beneficial effect of applications of molasses. The results to date indicate that molasses has a far-reaching effect on soil tilth and brings about an increase in the number and stability of the aggregates present in the soil.



Fig. 1.
Showing the network of mycelial threads developed within a soil to which molasses had been applied.
(Magnification $\times 150$.)



Fig. 2.
Volcanic soil showing the formation of aggregates due to the application of molasses.



Fig. 3.
A sample of the same soil which had not been treated with molasses.

In the soils to which molasses was applied a vigorous fungal growth rapidly occurred and the soil mass became interlaced with mycelial threads as shown in Figure 1. The binding effect of these on the finer fraction of the soil was most marked and a considerable increase in crumb structure was evident. The development of structural aggregates in a volcanic soil from Southern Queensland which was brought about by an application of molasses is shown in Figure 2. This should be compared with the untreated soil as shown in Figure 3, where the number of similar structural aggregates in an equal quantity of the same soil is seen to be very much smaller.

Figure 4 illustrates graphically the effect of applications of molasses at the rate of 3, 6 and 12 tons per acre to three very dissimilar cane soils from Bundaberg. In all cases there was an appreciable increase in the number of stable aggregates present in the soil and this effect varied with the amount of molasses applied. Further work is now being carried out to determine the degree of permanence of this improvement in tilth and also to investigate the effect of the application of residual matter other than molasses.

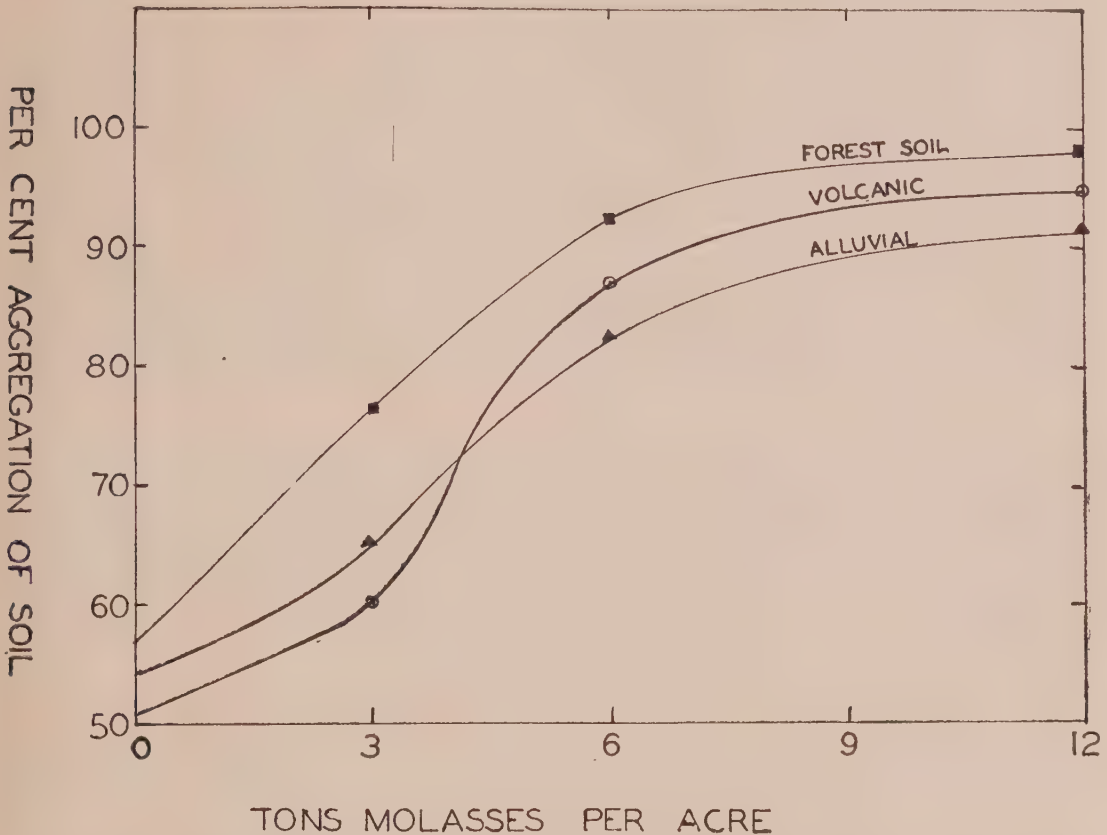


FIG. 4—Showing the percentage of soil formed into water stable aggregates as a result of the application of molasses.

NORTHERN SUGAR EXPERIMENT STATION.

(Mr. G. BATES, Senior Adviser, Officer in Charge.)

Weather conditions over the latter part of 1948 were not as favourable as those for the corresponding period in 1947. Only 3·80 inches were recorded on 34 wet days from July to the end of November. There was sufficient moisture in the soil to germinate the spring plant cane, but the dry weather which followed caused many young shoots to die off. However, a fair germination was obtained on most blocks, and light showers during August helped to maintain soil moisture. Crops throughout the district, especially ratoons, made slow growth in September and October. In November and December all crops were showing the effects of the dry weather and required rain. Over 8 inches were recorded at the end of December and with the accompanying hot weather the response was rapid and all crops commenced to make quick growth. The wet season commenced quietly, only 10 inches being recorded in January and 18 inches in February. However, in March, 29 inches were registered, of which 18 inches fell on the last three days. These heavy falls caused the river to rise to a record height and all creeks in the area were flooded. Some damage to crops was caused by the floods. Good growing conditions were maintained until the end of May and early June. Very little rain was recorded in May and June and crops stopped making rapid growth; however, a good crop was grown over the wet season and the harvest should be a good one. Preparation of fields for planting was delayed owing to the late wet season and accordingly planting was carried out extensively in June.

Beetle flights were rather heavy from late December to early January and the resulting grub infestation in the Mulgrave area is the heaviest on record since 1934; a survey showing that 3,000 acres are infested with the greyback grub. In the Highleigh, Meringa, and Banna sections of this area the only undamaged cane is that which was treated with "Gammexane." The use of this insecticide as a means of controlling damage from the greyback grub has now been proved to be highly successful. Flooding during March and April, allied with the present grub infestation, is causing considerable deterioration on some of the river flats. The area treated with "Gammexane" in the Mulgrave Mill area for the 1949 crushing season consists of 600 acres treated in 1947 (now first ratoons) and 1,600 acres of plant cane treated in 1948.

On the Experiment Station all blocks were treated with "Gammexane" except a block of ratoon seedlings to which an application was made in the plant crop. Slight grub damage showed in one end of this block in June indicating that the original application of 80 lb. per acre was not heavy enough to give complete control in the first ratoon crop. Similar blocks treated in the plant crop and given a further 50 lb. per acre in ratoons were completely protected. All other treated blocks appear free from damage, though up to twenty-three grubs have been found under stools of guinea grass adjacent to these blocks, indicating that grub damage to the station cane would have been heavy had "Gammexane" not been applied.

The following tables show the rainfall records taken at the Northern Sugar Experiment Station over the past 24 years together with an abstract of other meteorological observations:—

Year.	Rainfall in Inches.					Year.	Rainfall in Inches.				
1925	76	98	1938	55	86						
1926	59	12	1939	118	08						
1927	90	16	1940	84	58						
1928	66	33	1941	84	65						
1929	102	28	1942	60	14						
1930	107	61	1943	47	31						
1931	98	82	1944	60	73						
1932	76	31	1945	117	60						
1933	96	06	1946	55	18						
1934	91	44	1947	43	67						
1935	59	91	1948	70	13						
1936	88	81	1949 (6 months)	73	16						
1937	46	33	Average for 24 years = 77.42								

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT NORTHERN SUGAR EXPERIMENT STATION,
GORDONVALE, FROM 1ST JULY, 1948, TO 30TH JUNE, 1949.

Month.	Rainfall (Inches).	Number of Wet Days.	Shade Temperatures.						Mean Diurnal Range.	Mean Tempera- ture 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.	
			Maximum.			Minimum.						
			High.	Low.	Mean.	High.	Low.	Mean.				
1948.												
July	1.60	13	85.5	74.0	79.9	68.5	47.0	59.4	20.5	69.5	80	
August	1.67	7	86.5	72.0	81.6	67.0	44.0	54.56	27.04	68.54	75	
September	0.01	1	94.0	81.5	86.7	66.0	44.5	53.24	33.46	72.65	60	
October	0.15	3	97.5	88.0	92.26	69.0	52.5	62.06	30.20	79.4	62	
November	0.37	10	100.0	89.0	93.0	76.0	51.0	68.0	25.0	82.75	64	
December	8.81	12	97.0	87.0	93.48	74.5	64.0	70.39	23.09	84.23	68	
1949.												
January	10.14	16	99.0	81.5	90.98	80.0	66.0	72.04	18.94	82.54	75	
February	18.76	15	98.5	82.0	91.29	78.5	65.0	72.5	18.79	82.60	79	
March	29.66	23	97.0	81.0	90.12	77.5	65.0	73.04	17.08	81.19	95	
April	12.04	18	87.0	75.5	83.14	75.0	55.0	68.03	15.11	75.37	86	
May	2.31	13	86.5	74.0	81.46	68.0	53.0	62.25	19.21	72.33	85	
June	0.25	5	84.5	70.0	78.12	67.0	40.0	55.98	22.14	66.64	84	

Work of the Station.

Field Day was held at Meringa on 12th May, and despite the threatening overcast sky the day was well attended by 280 growers and other visitors connected with the sugar industry. Rain fell at intervals, but it was possible to conduct visitors on a tour of the station in groups, with Bureau staff acting as guides. An excellent display of tractors and other agricultural machinery caused considerable interest.

Seedling selection in the 1948 crop was carried out under good conditions, these blocks having been treated with "Gammexane," and the cane was well grown and standing upright. Eighty 40-sett plots were planted out as a result of selection. From the 168 varieties planted in 40-sett plots during the previous year, 28 were selected and planted in a Yield Observation trial with Trojan as standard. In addition, eight varieties from the first ratoon 40-sett plots on Division D.5 were selected and planted in a Yield Observation trial on E.3, using Trojan and Badila as standards.

In the cross-pollination work 130 crosses were made by the end of June. The weather was fine except for a few light showers towards the end of the month. A full discussion of the seedling work appears in the report on cane breeding.

Ramie.—The ramie planted on good land the previous year grew well and was twice cut. After each cutting the ratoons came away strongly and grew well. During the wet season, water lying in a hollow caused the ramie to die off badly, indicating that this crop will not thrive where water lies for any length of time.

Disease Trials.—The downy mildew and leaf scald trials were again planted at Pine Creek. Both these trials were failures due to dry conditions following the planting, and owing to the water supply at Pine Creek failing, the cane could not be irrigated. More extensive information regarding these diseases appears in the notes of the Division of Entomology and Pathology.

Potash Trial.—This trial was planted in the form of a Latin Square in 1947. The object was to find out if the time of application of potash has any bearing on maturity. Each plot was sampled at monthly intervals during the 1948 crushing period, and more detailed notes on this trial appear in the Report on Soil Technology.

Experiments Harvested during the 1948 Season.—Four seedling trials were harvested during the year. These consisted of a plant trial in the form of a 6 x 4 randomised block on Division A.2, a ratoon trial in the form of an 8 x 3 randomised block on A.5, a yield observation trial on plant cane on Division A.4, and a similar trial on first ratoon cane on Division A.1.

The plant randomised block in which E.209, E.230, E.247, E.269, and E.275 were compared with Trojan was harvested in October at the age of 14 months. Trojan with 7.98 tons of sugar per acre exceeded all varieties at the 1 per cent. level of significance. E.269 was next with 6.71 tons of sugar per acre, exceeding E.247 at the same level. E.275 with 6.42 tons and E.209 with 6.22 tons significantly exceeded E.247 at the 5 per cent. level. E.230 yielded 6.15 tons and E.247 5.51 tons of sugar per acre. E.269 received favourable comment for its erectness, weight, thick barrelled sticks, and evenness of stand, which made harvesting comparatively easy. E.247 on the other hand lodged rather badly. E.239 was originally planted in this trial but owing to a very poor strike in this plot and in other trials it was ploughed out and E.275 planted in its place. E.275 was therefore only twelve months old at harvest, being planted almost two months later than the other varieties. E. 269 and E.275 have now been planted on better land for further observation.

CENTRAL SUGAR EXPERIMENT STATION.

(Mr. C. G. Story, Senior Adviser, Officer in Charge.)

Meteorological and Crop Growth Reports.

Good rainfall, including one registration of 237 points, was experienced in the Mackay area in early July. However, this had an adverse effect on many newly planted blocks of cane since it caused the soil to set hard, and farmers had difficulty in breaking the resultant crust which formed above the plants. Cool weather followed and many of these blocks did not recover until later in the season. August was dry, but, despite the temporary effect of the hot northerly winds experienced, the cane remained in good condition. Similar weather continued throughout September and generally the crops encountered trying conditions during these two months. While the days were hot with strong northerly winds, the nights were cool and a light frost was recorded at the beginning of September. Relief rain was required to ensure the progress of the well-established young plant cane and the ratooning cane.

A smoke haze from bushfires covered the area during the first week in October; this was followed by dusty conditions for the remainder of the month. The days were hot, but relief was afforded at the end of the month by a fall of 129 points of rain. This rainfall altered the local situation considerably, but unfortunately for the district as a whole it was not widespread. In the areas where it occurred relief was given to the spring plant cane, which had suffered most during the dry conditions experienced. This dry period is reflected in the weaker stands and poorer stooling of spring plant cane, compared with the earlier planted cane in the district.

November weather did not assist the young crop as the days were very hot. Most of the cane wilted daily by 8 a.m. and remained in this condition until late afternoon. By the end of this month the situation with respect to water supplies was very serious, and the district was hoping for an early wet season to alleviate the distress. However the position did not change until the 20th December, when good rainfall occurred, which continued right through until the end of March.

Excellent growing conditions were experienced during January, February, and March and all crops made very rapid progress, especially in March following the excellent conditions of the previous two months. During February, Mackay was fortunate to miss the full force of the cyclonic disturbance experienced both north and south of the area. However, heavy rain was received on the night of the 15th, when 857 points were recorded at the Experiment Station, while even heavier falls were recorded closer to Mackay. This is the second year in succession that the regular heavy wet season with its continued and wasteful downpour did not eventuate. The good growing conditions continued during April, but it was soon evident that the crop would arrow heavily and by May this was apparent throughout the district. This will affect the ultimate tonnage for the season, by reason of the earlier cessation of growth.

During June, 14 points of rain were registered. Cold weather was experienced and exceptional frosts occurred during the month, especially on the Gargett-Pinnacle flats and other frost-susceptible areas of the Mackay district. This year blocks on the higher land, normally regarded as fairly free from frost, were affected.

The total rainfall for the period under review was 46.95 inches recorded on 95 days. This was 8.55 inches more than the previous twelve-monthly period, which recorded 38.40 inches on 108 days. The difference is not very great and is practically equal to the rain recorded for the one storm in February. However, the 1947 spring rainfall was entirely different, being more plentiful and much more favourable for cane than the 1948 spring rainfall. For the four months, December, 1948, to March, 1949, practically the same rainfall occurred as in the total twelve-month period given in last year's annual report.

The excellent prospects for the 1948 season were reflected in the record crops harvested for the district as a whole and for a number of individual mill areas. The average tonnage per acre was considerably above that for 1947 and well above the average for the past ten years. This was also the case at the Experiment Station, where the crop harvested was a record both in total yield and tonnage per acre. Favourable sugar figures were obtained, the value of the new variety, Q.50, being reflected in the good results obtained in the early part of the season. However, the sugar content of the cane dropped with the intervention of wet weather in December and with the extension of the crushing season into a wet January.

A number of blocks in the district showed evidence of grub damage and large flights of greyback and "frenchi" beetles occurred in December following the rain.

The Mackay raised varieties Q.28 and Q.50 once again demonstrated their value to the district, but Q.50, which has given excellent results throughout the area both in tonnage and c.e.s., is replacing Q.28. The latter has lost favour due to ratoon failures from Q.28 ratoon stunting disease. Plantings of Q.50 in 1948 constituted approximately 60 per cent. of the total area planted.

The following meteorological observations were made at the Station during the year.

The rainfall records (also given below) were, prior to 1935, made at the old Sugar Experiment Station, Lagoons, but since that date have been taken at the site of the present station at Te Kowai.

ANNUAL RAINFALL SINCE 1920 AT THE SUGAR EXPERIMENT STATION, MACKAY.

Year.	Rainfall Inches.	Year.	Rainfall Inches.
1920	57.27	1936	97.37
1921	95.89	1937	56.60
1922	34.47	1938	52.18
1923	25.23	1939	56.14
1924	53.37	1940	84.97
1925	54.80	1941	71.38
1926	34.60	1942	77.92
1927	83.87	1943	60.11
1928	72.28	1944	53.16
1929	64.03	1945	46.76
1930	55.81	1946	53.74
1931	30.01	1947	53.39
1932	48.48	1948	41.80
1933	71.94	1949 (6 months)	34.41
1934	37.57	Average for 29 years	57.60
1935	45.15	Average at Te Kowai 14 years	60.76

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE CENTRAL SUGAR EXPERIMENT STATION, MACKAY, DURING PERIOD 1ST JULY, 1948, TO 30TH JUNE, 1949.

Month.				Rainfall (Inches).	Wet Days.	Average Rainfall (Inches).	Shade Temperature.					
							Maximum.			Minimum.		
							High.	Low.	Mean.	High.	Low.	Mean.
1948.												
July	3.23	5	1.39	78	65	72.8	65.5	37.5	50.6			
August	..	..	0.99	85.5	68.5	76.1	59.5	40	49.7			
September	0.04	1	1.55	94	72	80.6	63.5	38	50.8			
October	1.47	3	1.76	90.5	79	85.1	72	51	60.2			
November	0.20	3	2.95	92	82	87.3	76.5	54.5	66.2			
December	7.60	12	6.62	94.5	81.5	86.8	75.5	63.5	69.3			
1949.												
January	8.03	16	13.20	92	80	85.1	76	61	69.1			
February	14.45	13	12.28	91.5	82	87.3	76	63	71.1			
March	7.76	18	10.68	89.5	78.5	83.7	76	65.5	69.2			
April	2.15	14	5.14	84.5	73.5	78.35	70	46.5	63.3			
May	1.88	8	3.03	82.5	70	76.5	63	40.5	56.1			
June	0.14	2	2.47	79.5	61	71.9	63	35	46.5			
Totals and Averages ..				46.95	95	62.06	..	..	..	..	..	

Work of the Station.

Experiments Harvested during 1948 Season.—Four varietal trials were harvested during the 1948 season, being a plant randomised block trial including "E" seedlings and Q.28, a yield observation trial on plant cane with "G" seedlings and Q.28, a first ratoon 5 x 5 Latin Square trial including Q.50, Q.28, B.174, P.O.J.2878, and Trojan, and a yield observation trial with first ratoon "F" seedlings, C.140, Q.42, Q.51, 32/3575, and Q.28. In addition to these, three Q.28 "ratoon stunting disease" trials, a potash trial, two mercurial planting trials, a Q.50 standover observation trial, a first ratoon filter mud plus fertiliser trial and a first ratoon fertiliser placement trial were harvested.

The randomised trial contained "E" seedlings 119, 122, 124, 129, 135, and Q.28. In February, 1948, Q.28 was not outstanding compared with E.119 and E.129, which appeared to be the best two varieties in the trial. E.135 had a good stalk length, but the stooling was variable, while E.122 and E.124 were less advanced than the standard. During September all the canes excepting E.122 withstood the dry weather well. At harvest E.129 gave the best results with 5.49 tons of sugar per acre, thus exceeding all other varieties at the 1 per cent. level of significance. The yields of the other varieties in tons of sugar per acre were: Q.28 (4.83), E.135 (4.82), E.119 (4.70), E.122 (4.09), E.124 (4.00).

The yield observation trial on plant cane included 20 "G" seedlings with Q.28 as the standard variety. Some of these seedlings were slow germinators when compared with Q.28, which gave the best germination figures. During August it was considered that Q.28 would outyield most of the varieties, and this was borne out by the result at harvest in November. Final selections will not be made until the results of the ratoon crop are known.

In the Latin Square ratoon trial, Q.50 demonstrated in no uncertain manner its superiority over other varieties in the trial. It significantly exceeded all others, while all varieties were significantly superior to Trojan in both cane and sugar per acre. In addition to demonstrating the superiority of Q.50, this trial confirmed the promise shown earlier by the Mackay seedling B.174 and it was therefore included in a number of farm trials during the 1948 planting.

The yield observation trial on ratoon cane included 14 "F" seedlings and C.140, Q.42, Q.51, and 32/3575, their performance being tested against Q.28. The ratoons produced a much heavier crop than the plant cane and the results indicated that the seedlings F.124, F.135, F.160, F.184, and F.186 showed sufficient promise for further trial.

The observation trial on the block of Q.50 standover plant cane gave useful information on the possibilities of this variety for standover purposes. Under the conditions of the experiment in which the first year growth was not heavy and no long wet periods or high winds were encountered, the standover returns were satisfactory. However, general experience indicates that the use of Q.50 as a standover variety would be more than a normal farm hazard and should be avoided whenever possible.

The first ratoon crop of the filter mud plus fertilizer trial was harvested. When the plant crop of this experiment was cut the results indicated that the application of mud prior to planting had not brought about an increase in tonnage of cane and that it had caused a slight decrease in c.c.s. content. However, the yields obtained from the first ratoon harvest showed that the mud had now decomposed and was capable of supplying nutrients to the plant since it had brought about an increase in yield of cane per acre. Nevertheless the application of mud has not yet entirely justified itself, since there was no definite indication that the yield of sugar per acre was also increased. As was the case with the plant crop the application of fertilizer (Sugar Bureau Mixture No. 1) once again brought about a definite increase in cane and sugar per acre.

A considerable amount of information concerning the "ratoon stunting disease" of Q.28 was obtained from the three experiments carried out during the year. These results are of particular importance in view of the value of this variety to the Mackay district. Further information concerning the effect of mercurial compounds on germination was provided by the harvesting of two randomised trials, the planting material of which had been dipped in several commercial fungicides. Weekly germination counts were made for 16 weeks on the variously treated blocks. Details of the complete work carried out on Q.28 disease and mercurial dipping is given in the report of the Division of Entomology and Pathology.

Lansdowne Road Seedling Plots.—Further plantings of original seedlings were made at Lansdowne Road and first year selections from the previous year's seedlings were planted out in 40 sett plots.

Legumes.—Observation trials with four varieties of velvet beans were planted on representative farms in the area and satisfactory crops were obtained. An undesirable feature of present commercial legumes is that they do not give satisfactory early control of grass which later seeds to the detriment of the subsequent cane crop. In an attempt to overcome this disadvantage, mixed plantings of Poona pea and velvet beans were made on representative farms, since it was expected that the Poona pea would provide early cover whilst the velvet beans would control grasses in the later stages. The results indicated that this combination gave a fairly satisfactory control of grasses.

Six cowpea varieties were planted late in a wilt and bean-fly resistance trial and African pea and Cristaudo pea were the only survivors. The latter was outstanding, and it was therefore planted out on farms in the area where it promises to give good results. Reeve's Selection (Q.1582) and Cristaudo pea are considered to be far superior to Poona pea as green manure crops in the Mackay area.

Experiments initiated during the year.—These included long-range trials to measure the effect of various crop rotations on soil fertility and a varietal trial with Co.301, C.P.29/116, Pindar, Q.27, Q.49, and Q.50.

In addition two frost-resistance trials with seedling canes were established at Gargett.

Field Day.—The 1949 Field Day was held at the Mackay Sugar Experiment Station on 4th April. Approximately 550 persons attended and visitors were conducted on a tour of the Station in parties of twelve or fifteen by members of the Bureau staff, who acted as guides. An excellent display of implements and tractors was provided by Mackay agencies and manufacturers and considerable crowds were attracted to the Maloney and Kinnear cane-harvesting machines which were exhibited.

Laboratory Work.

The following is a summary of the c.e.s. analyses carried out during the year :—

[illegible]

SUMMARY OF CROPS HARVESTED ON STATION.

[illegible]

SOUTHERN SUGAR EXPERIMENT STATION.

(Mr. H. G. KNUST, Senior Adviser, Officer in Charge.)

Meteorological and Crop Growth Report.

The winter of 1948 was comparatively mild and no frost occurred after the 30th June. Drought conditions set in after the first week of July and persisted until the second week of December, when slightly more than an inch of rain was recorded. Although reasonable rains fell during January, soil moisture was not good and remained unsatisfactory until mid-February, when heavy rain occurred. Gale-force wind, accompanied by heavy rain, was recorded during the first week of March, but did not cause any appreciable damage to crops. Rainfall in April, May, and June was well below average.

Frosty conditions developed during the beginning of May but did not do any harm to crops, and it appeared that an early severe winter might prevail. However, temperatures rose again and remained at reasonable levels until the end of June, when two successive sharp frosts caused localised damage to young crops throughout the district.

Crops.—Growth during the spring and early summer months was unsatisfactory. After the heavy rains at the end of February optimum growth response was evident and was well maintained until the end of April. The growth rate slackened when frosts occurred in early May and has not improved since then. Germination of autumn plant was good generally, and good stands of young plant cane were in evidence throughout the district. Arrowing of mature cane was somewhat heavy on the coastal fringe and much of the C.P.29/116 flagged profusely throughout the district. District yields during the coming crushing season should be about the same as last year's tonnages.

RAINFALL RECORDS, 1914-1949.

Year.	Rainfall Inches.	Year.	Rainfall Inches.
1914-15	31.99	1932-33	36.81
1915-16	28.54	1933-34	71.45
1916-17	58.08	1934-35	40.01
1917-18	49.85	1935-36	44.24
1918-19	24.24	1936-37	31.65
1919-20	28.20	1937-38	44.40
1920-21	45.16	1938-39	41.01
1921-22	44.97	1939-40	41.69
1922-23	37.14	1940-41	43.26
1923-24	34.16	1941-42	33.52
1924-25	50.96	1942-43	40.75
1925-26	37.62	1943-44	45.22
1926-27	68.18	1944-45	28.14
1927-28	74.69	1945-46	26.10
1928-29	31.16	1946-47	44.52
1929-30	43.16	1947-48	57.76
1930-31	47.19	1948-49	40.18
1931-32	22.88	Average for 35 years	41.96

ABSTRACT OF METEOROLOGICAL OBSERVATIONS MADE AT THE SOUTHERN SUGAR EXPERIMENT STATION, BUNDABERG, FROM 1ST JULY, 1948, TO 30TH JUNE, 1949.

Month.	Rainfall (Inches).	Wet Days.	Shade Temperatures.						Mean Diurnal Range.		
			Maximum.			Minimum.					
			High.	Low.	Mean.	High.	Low.	Mean.			
1948.											
July	2.04	5	77	65	70.4	64	47	53.1	17.3		
August	0.06	2	79	66	73.9	69	48	57.1	16.8		
September	0.81	5	93	71	78.6	70	49	61.9	16.7		
October	0.46	2	87	79	82.4	80	58	68.7	13.7		
November	0.42	5	91	82	86.1	80	64	73.8	12.3		
December	4.28	12	91	79	85.3	81	72	76.1	9.2		
1949.											
January	5.80	14	93	81	85.4	82	62	72.0	13.4		
February	10.02	13	92	72	86.2	76	65	70.8	15.4		
March	12.84	21	87	69	81.5	75	60	69.1	12.4		
April	1.40	9	86	69	78.3	64	44	59.5	18.8		
May	0.35	6	79	67	74.5	62	35	52.4	22.1		
June	1.70	6	74	57	69.0	61	36	43.0	26.0		
Totals	40.18	100	..	..	..	..	..	..	..		

Work of the Station.

Plant Distribution.—A distribution of Q.28 and P.O.J.2714 was made to Gin Gin growers and Atlas to growers in the Bingera area during the spring of 1948. Applications for these varieties were extremely disappointing and it is doubtful if growers were really interested in them despite the requests made for the general release of the canes.

New varieties introduced from quarantine during the year were M.171/30, M.134/32, M.112/34, M.165/38, M.63/39, M.76/39, 33S.N.1882, 29S.N.382, and Co.301.

Experiments harvested during 1948 Season.—Most of the experiments harvested during the year were of the usual type associated with seedling production, selection, and testing.

Ten "F" seedlings were selected from the plant Yield Observation trial and replanted in an 11 x 4 randomised trial. Of the ten selected eight had a percentage of P.O.J.2878 x Co.290, one was P.O.J.2725 x Co.290 and one Co.419 x P.O.J.2940.

The dispersed randomised trial with the ten "D" seedlings did not reveal any seedling of outstanding promise.

In the second ratoon Latin Square trial B.50 and B.56 were planted in competition with Q.28, Q.49, and Q.52. No significant difference was obtained between crop yields, which ranged from 35.7 to 41.2 tons per acre, but B.50, Q.28, and Q.49 gave the best yields of sugar per acre. B.56 has been discarded because of its susceptibility to downy mildew, and B.50, although showing a tendency towards poor early quality, is being subjected to further trial.

Harvesting of the plant crop on Block B.4 commenced the third cycle of the rotational trial. This long-range experiment was first planted in autumn, 1938. The design has been fully described in previous annual reports and the following brief description of the layout will suffice. The trial consists of three rotational treatments—

- (1) Eighteen months fallow with legumes followed by a plant and one ratoon crop of cane;
- (2) Six months fallow with legumes followed by plant, first and second ratoon crops; and
- (3) Similar to (2), but in the replanting of the trial at the end of the crop cycle the original variety is replaced by a fresh variety.

Yields from the plant crop in this cycle were (1) 47 tons per acre; (2) 46.35 tons per acre; and (3) 39.93 tons per acre. This trial will now be ratooned in order to further investigate the effect of the permanent rotations.

The dressings of minor element compounds were repeated on the second ratoons of the trial on Block B.6. A splendid crop was produced, and although no significant gains were recorded from the copper, zinc, boron, or manganese treatments there was a suggestion that manganese was better than the others.

The plant crop harvested from the fifth rotation of the permanent trash trial on Block E.3a again did not indicate any increase in yields from trash conservation on this red volcanic soil type under southern climatic conditions. Aggregate yields to date amount to 279.7 tons for the trash plots and 281.1 tons for the no-trash plots, or 31.07 and 31.23 tons per acre per crop average.

The rotary filter mud plus fertilizer trial on Block E.3b yielded an average of 68.53 tons of cane per acre, and although the mud application somewhat increased the cane yield there was no significant increases in sugar yields per acre. Furthermore, as is often the case on this red volcanic soil type, the fertilizer treatments did not produce any significant response in the plant crop, probably because an adequate fertilizer programme had been maintained for preceding crops.

Yields from the second ratoons of the third rotation of the fertilizer and plant residue trial on Block E.4 again did not produce any significant differences in the trash and green manure treatments although good responses were obtained from the fertilizer applications. This trial, which was first planted in March, 1938, has now completed three cycles. The trial area is divided into six blocks, and on two of these the trash has been burnt at harvesting, on another two the trash has also been burnt but a green manure crop has been grown prior to planting, while on the remaining two blocks the trash has been turned into the soil and a green manure crop also grown. a fertilizer experiment involving the use of (a) no fertilizer, (b) nitrogen plus phosphoric acid, (c) phosphoric acid plus potash, and (d) nitrogen plus phosphoric acid plus potash was superimposed upon the plant residue treatments.

A review of the results of the three cycles indicates that the burning of the trash made no difference to subsequent yields, nor did its conservation have any effect. It is also noteworthy that the growing of the green manure crop had no effect on crop yield in spite of the fact that nitrogen was not applied to any of the plant crops. The nitrogen which was applied to both first and second ratoons gave large increases in all cases, irrespective of whether a green manure crop

had been grown prior to planting. This somewhat anomalous reaction to nitrogen is typical of this red loam soil. Apparently the short fallow period between ploughing out the final ratoon and replanting is responsible for a build-up of available nitrogen which is sufficient for the plant crop. There is possibly also a carry over from the nitrogen applied to the preceding ratoons with the net result that the additional nitrogen from the legume residues was not required for the plant crop. It is interesting to note also that it had no residual effect on the following ratoons.

Water Supply.—The station irrigation water supply did not cause any concern and supplies of water were sufficient for seedling requirements. The position appears to be satisfactory for the next seedling programme.

New Experiments initiated during the year.—A deep placement nitrogen trial was established to determine the value of placing the nitrogen below the setts at planting time in comparison with the usual top dressing of nitrogen. In addition a weedicide trial with 2-4D, diesel oil emulsion and sodium pentachlorophenate in various combinations was set out. A randomised variety trial with ten "F" seedlings was also established.

Legumes.—Four strains of velvet beans—C.P.I.2041, C.P.I.2043, C.P.I.2271, and C.P.I.2272—were received from the Commonwealth Plant Introduction Service and tried out against the four strains—Black Mauritius, Jubilack, Marbilee, and Somerset—which have shown promise in the district. The C.P.I. strains did not show up to advantage against the other varieties, but seed will be picked and further trials made.

Reeve's selection Q.1582, 4250, 4312, and Cristaudo pea were tried out against Poona pea. In this trial 4250 and 4312 suffered early and severe bean-fly attack; Poona pea and Reeve's selection were only moderately attacked, while Cristaudo pea showed only an occasional plant killed by bean-fly. Cristaudo pea gave the best yield of green matter per acre, the yields in tons per acre being Cristaudo pea, 10.4; Reeve's selection, 8.43; Poona pea, 6.48; 4250, 4.05; 4312, 2.29.

Weedicides.—Trials were carried out to investigate the control of weeds and grasses in young cane by sprays containing diesel oil emulsion, sodium pentachlorophenate and 2:4D in various concentration and at different times of application. Pre-emergence spraying with solutions of 2-4D gave very satisfactory control of both weeds and grasses in two trials, one of which was set out just before the heavy rains of early March. It is of interest to record that pre-emergence sprayings of 2:4D gave good control of Gambia pea in a trial established in young ratoons. In this trial also, there were indications that a control of this plant is possible with contact sprays of diesel oil emulsion plus sodium pentachlorophenate.

Power spray equipment for tractor attachment has been designed and placed into operation. It is planned to carry out a series of weedicide trials with this equipment during the coming summer months.

Laboratory Work:

The following is a summary of cane and water samples handled during the year:—

Station and trial cane samples	..	..	..	..	..	..	..	..	1,429
Farmers cane samples	..	..	..	..	..	..	..	..	347
Irrigation waters	..	..	..	..	..	..	..	..	20

SUMMARY OF CROPS GROWN ON STATION.

Varieties harvested 1948 season—	Tons.
P.O.J. 2878	307.29
Q. 48	183.75
C.P. 29/116	108.70
Q. 49	68.50
Seedlings	259.80
Total	928.04
Plant cane harvested	572.17
Second ratoon cane	355.87
Total	928.04
Total cane harvested for mill	928.04
Used for samples and plants on station	4.54
Total crop	932.58
Total acreage harvested	25.42 acres
Average tonnage per acre	36.68 tons

REPORT ON THE WORK OF THE FIELD STAFF.

By NORMAN J. KING.

General.—The bulk of the work of the field staff is associated with the field experimental programme laid down by the Divisions of Soils and Agriculture and Entomology and Pathology. The various Senior Advisers, Advisers, and Cadets attend to the planting and harvesting of field trials, whether varietal, fertility, pathological, or entomological. They also conduct soil fertility surveys, make the regular inspections and observations on field experiments and carry out general advisory work with the growers of their respective districts. The field staff are also the liaison officers between Bureau Head Office and the various Cane Pest and Diseases Control Boards and carry out farm inspections associated with settlement of returned soldiers and rehabilitation schemes.

The usual annual meeting of field staff was held at Mackay in April concurrently with the conference of the Queensland Society of Sugar Cane Technologists.

Details of the varietal and fertility trials harvested during the 1948 season appeared in the January and April Quarterly Bulletins and the results of these experiments are discussed only generally in this report.

Growth of the 1949 Crop.

In the far north advantage was taken of the early cessation of the wet season to carry out most of the planting in the autumn period. Germinations were fair to good except in the Burdekin district, where the use of much immature planting material resulted in poor strikes. The open winter experienced in the central district allowed of early planting being carried out instead of the heavy spring programme usually followed. Good results were obtained in that area and also in the south, where both autumn and spring plantings were successful.

In all districts a dry spring was experienced and crop development was retarded in consequence. In the far north the wet season began in December and was prolonged into May, growth being good for a period of several months where waterlogging and flooding did not interfere. In the Babinda and Tully areas, however, torrential rains caused some crop damage and flood conditions persisted for longer periods than usual. Good rainfall distribution in the central district assured good crops there also, but the season in the south was not so favourable; the growing season was short and was preceded by a very dry spring and early summer.

Following are more detailed notes on the 1949 crop in the various districts:—

Northern Districts (North of Townsville).—The 1948-49 year opened with a stretch of dull showery weather, resulting in unsatisfactory planting conditions, and many unsatisfactory strikes were noted in later planted cane. This was followed by a dry spell which lasted until the latter part of December. This had a very serious effect on the growth of the cane generally, especially on the plant crop. By the end of January the cane was somewhat backward, but some varieties stood out as far as drought resistance was concerned in this period, Q.50 being of particular note.

Rain was very heavy and continuous during the first four months of 1949, and in the Babinda area this persisted into May. As a result the season for the "early plant" was very short and many farmers were still planting when mills began crushing. During March and April torrential rain was experienced in the Babinda-Innisfail belt, amounting to 106 inches at Babinda and 89 inches at Innisfail.

Giru and Burdekin.—It was stated in last year's report that a comparatively small amount of rain was recorded during the normal wet season period of 1948. Drought conditions continued during the winter and early spring, the first useful rains recorded being in the latter half of December, 1948. Showers and some periods of heavy rain continued until the end of March, 1949, and in this period no flooding of a serious nature occurred in cultivated areas, though road communication between Ayr and Home Hill was severed by the Burdekin River, which maintained a constant flow for some months. A cyclonic disturbance which caused extensive damage at Cooktown and other northern centres was centred over Ayr on the evening of 15th February, 1949, moving in a south-easterly direction. The depression was moving rapidly and rain recorded at the time was not great. A small amount of damage to crops resulted from gusty winds which caused some lodging in more advanced crops. Overcast weather for a long period coincided with the long wet season, and it is thought that the reduction of sunlight may have reduced crop growth throughout the area. Fairly extensive arrowing occurred during the early winter months and this is expected to have a considerable influence on the mill estimates, which will probably be reduced by some thousands of tons of cane.

Central Districts (Proserpine-Mackay-Sarina).—The year just ended was very similar in most respects to that of 1947-48, when record crops were harvested throughout the Central district. Rainfall was comparative, as although during both seasons the total precipitation was well below the district's annual average of 67 inches, the distribution of the more restricted rainfall was again the main factor in the excellent crops grown.

The total fall for the 1948-49 season was 46.95 inches from 95 wet days against 38.4 for a period of 108 wet days in the preceding season. In the north coast and Proserpine areas the falls greatly exceeded this total with resultant localised flooding and soil waterlogging. Crops in the latter mill area suffered accordingly and are below last year's record tonnage. However, the southern districts, particularly Carmila, received even less rain than the Mackay area and crops are not up to expectations.

Although cyclonic disturbances brought heavy falls and localised flooding in many of the sugar-producing centres of the State, the Mackay district did not receive any very heavy falls, but useful rain eventuated from these depressions. Only one small fresh occurred in the Pioneer River.

The usual dry spring and early summer period was again experienced and retarded all crop growth during the period. This annual dry period has a detrimental effect on prospective crops, particularly in years followed by normal heavy wet seasons, as the cane is not usually sufficiently advanced to compete with the copious weed growth and survive the waterlogging which generally ensues. However, during this particular season the severe dry period was followed by steady, intermittent, soaking falls with optimum soil temperatures. The cane commenced a vigorous growth which continued, aided by good monthly falls, throughout the early autumn months.

Southern Districts.—Rainfall for the twelve months period from the 1st July, 1948, totalled 40.18 inches, which, though near normal average, was notably deficient during the spring and early summer and was concentrated mainly in the late summer months of February-March.

The winter period of 1948 was exceptionally mild and this, combined with the good moisture present from the excellent autumn rains, was reflected in the increasing estimates for the 1948 crop.

The absence of any beneficial rains from July to December produced near drought conditions which, although ideal for harvesting, kept young cane growth at a standstill. This was only partly relieved during the next two months and good growing conditions did not materialise until the late summer period. Autumn and early winter, however, remained dry, and, with the incidence of frosts during the first week of May, crop growth remained stationery. Damage from frosts was somewhat severe in the South Isis area, whilst in the Bundaberg district frosting has been confined mainly to the leaf surface of young autumn plant cane on low lying areas.

The dry spring was beneficial to crops in the Moreton alluvial areas. Weather conditions permitted early ratooning, uninterrupted planting and harvesting, and facilitated weed control; these factors contributed to the development of a very large crop for 1949. At Maryborough the dry spring and summer delayed crop development, no useful rains being recorded until February and March.

Green Manure Crops.

The 1948-49 summer was not a good one for green manure crops. Climatic conditions and scarcity of seed combined to make good crops unusual rather than commonplace as would be expected in a summer of good rainfall. In the far north Poona pea crops succumbed to wilt in the heavy wet season and the only successful cowpea plantings were from Reeve's Selection and Cristaudo pea seed. Some very good crops of velvet beans were in evidence, the varieties Somerset and Marbilee being particularly outstanding. In the Innisfail area a heavy but unsatisfied demand existed for velvet beans, and since these are not susceptible to wilt they are a valuable crop for the high rainfall belt. It appears to be difficult, however, to interest seed growers in the production of this crop. In the central district also Poona pea died out with wilt, but Cristaudo pea, where planted, survived the wet conditions. High prices for cowpea seed had a marked effect on the acreage planted.

Gambia pea (*Crotalaria goreensis*) has lost favour in all districts owing to the hard seed remaining alive in the soil for long periods and causing concern by developing in growing cane. In the Bundaberg area there is a revival of interest in green manuring following the success of velvet bean varieties. The Isis Cane Pest and Disease Control Board disposed of some 2,000 lb. of velvet bean seed in other areas and it was unfortunate that several plantings left for seed collection in Bundaberg were attacked by a pod borer. Success was also attained in the Moreton area with velvet beans, but there, as in most other districts, the crops were ploughed in without seed being collected.

Varietal Trials.

A comprehensive series of trials was harvested including plant, first and second ratoon crops. In the Mossman area Q.44 in a plant trial proved to be superior to Badila and Badila Seedling in sugar per acre, although it was two units lower in c.c.s. In a second ratoon crop in the same area Eros was a far better performer than either Trojan or P.O.J.2878. In the aggregate of three crops Eros produced 13.74 tons of sugar per acre compared with 9.27 for Trojan and 9.57 for P.O.J.2878. Eros is a valuable cane on this granitic alluvial soil, but its high susceptibility to downy mildew makes it a risky variety where there is any threat from that disease. In the Gordonvale area Trojan and Cato were better than Q.53 and two "B" seedlings in a first ratoon crop although differences were not large. In the same district a six-farm dispersed trial failed to separate Trojan, Eros, and D.225 with any degree of significance. At Innisfail on a first ratoon

crop on four properties S.J.4 significantly exceeded Q.54 and Badila, the former producing 8.73 tons of sugar per acre over the two crops. In another trial at Innisfail on six properties Trojan was significantly superior to Eros and Q.54, the sugar per acre production for Trojan being 5.56 tons.

In the Lower Burdekin area Q.45 exceeded Q.50, Q.28, Eros, and E.K.28 in that order and gave the remarkably fine production of 10.46 tons of sugar per acre. Unfortunately the excessive hairiness of Q.45 makes it an unattractive cane to growers. In the same district a four-farm dispersed trial, in the first ratoon stage, showed Trojan, E.K.28, and Badila all performing well, but without significant differences.

In the Central district Q.50 defeated all other varieties in two trials at Proserpine, in a four-farm dispersed trial at Mackay and in a three-farm dispersed trial in the same area. The seedling A.130 exceeded Q.50 and other varieties in another trial, but its erratic sugar content will militate against its future development. Q.50 is now the favoured cane in this area and is rapidly supplanting Q.28 on the majority of farms.

In South Queensland C.P.29/116 performed remarkably well. The first ratoons of a dispersed trial on four farms gave C.P.29/116 a significant win over Q.28, Q.52, and Co.290, the former producing 10.24 tons of sugar as an aggregate of the two crops. In another dispersed trial Q.52 exceeded Q.47, Q.48, and P.O.J.2878, but its red-rot susceptibility has caused its elimination. On Bingera Plantation a 16 months plant trial resulted in Q.47 producing 10.23 tons of sugar per acre to significantly exceed at the 1 per cent. level Trojan, Q.49, Atlas, and P.O.J.2878, while in a second ratoon crop on another farm Q.47 exceeded Q.48, Q.49, and P.O.J. 2878. C.P.29/116 was superior to A.130, Q.50, Q.28, and Co.301 on another three-farm trial on the red volcanic soils, although the sugar content of Q.50 was higher.

On the alluvial lands of the Moreton area Vesta exceeded Q.47 and Q.49 as well as P.O.J.2878 and Akbar in a standover trial, while in a one-year trial of first ratoons C.P. 29/116 was superior to Q.47, Q.28, Co.290, and P.O.J.2878. Over the two crops of this trial C.P.29/116 produced 77.4 tons of cane and 10.8 tons of sugar per acre.

Varietal propagation and distribution.—The propagation of stocks of new varieties occupied a considerable amount of the field staff's time. In all districts plantings of new introductions were made either to provide stocks for comparative trials or to distribute to growers after their performance against standards was proved satisfactory. In the Bundaberg area sufficient stocks of Q.50 were propagated to ensure a general distribution during the 1949 spring planting season, while in the Isis, Maryborough, and Moreton districts further propagation will be required. Q.50 has also been planted out extensively in the Mossman, Hambleton, and Mulgrave areas, where it shows promise on the drier and poorer soil types. Pindar was pushed ahead in all districts owing to its favourable growth habit and early maturing characteristics, and Vesta is being propagated in part of the Bundaberg district as a possible replacement variety for P.O.J.2878 as a standover crop. Should Q.50 in the south retain the relative high early sugar which characterises it in Mackay its value to the southern districts will be difficult to estimate. The preponderance of the late maturing C.P.29/116 in those areas is having a marked effect on average sugar contents early in the season and an earlier maturing variety is badly needed. To a lesser extent Pindar is expected to fill the gap in the north, particularly in those areas where Badila has been replaced by Trojan and where, because of this change, the maturity peak has moved to a later date in the harvesting period.

CANE BREEDING.

By J. H. BUZACOTT, Senior Plant Breeder.

At the Northern Sugar Experiment Station the wet season of 1948 was somewhat curtailed, but showers during the winter months of June and July helped to maintain moisture. August, September, October, and November were dry months and the position was not relieved until the last ten days of December, during which period more than 8 inches of rain was registered. In consequence of the dry spring of 1948 all cane was relatively retarded in growth, and although good rains were recorded during January, February, and March, 1949, the general backwardness of the crops appeared to have some influence on the arrowing. The flagging which occurred during mid-May pointed to an excellent flowering season, but this promise was not maintained and some favoured parents failed to arrow. One of the principal of these was Oramboo. On the other hand, Korpi arrowed rather earlier than usual and Badila arrows were plentiful at Freshwater by the middle of June. The cross-pollination period during June, 1949, was dry and only a few points of rain occurred.

All crossing was carried out in sulphurous acid-phosphoric acid solution and it was found that even Co.270 arrows kept quite well in solution. Arrows of such varieties as Co.290 which prove particularly difficult to keep in solution also die rapidly in the field so it appears that no particular advantage is to be gained by making field crosses. At Meringa after the first week in June practically all arrows of Co.290 died before they became available for crossing and it was necessary to bring most of the arrows of this variety from Freshwater. Korpi flowered much earlier at Meringa than at Freshwater, whilst no Oramboo arrows emerged, although that variety showed plentiful flagging as early as the first week in June.

In making the crosses particular emphasis was placed on the production of early maturing varieties and every possible combination was made which might produce progeny having a good sugar content early in the season. Very few purely noble crosses were made, as seedlings from these now seem to lack the hardiness demanded in modern varieties. During the season 138 crosses were made and these are listed in Table I.

Fuzz was sown at Meringa, Mackay, and Bundaberg. At Meringa the main sowing was made in July although as stated in last year's Annual Report a small sowing was also made during April, 1948. At Mackay fuzz was sown during April, 1948, whilst at Bundaberg the fuzz planting was made early in July of that year.

At Meringa 7,123 seedlings (63 families) were planted in the field during October, 1948, from the July-sown fuzz and these together with the 1,300 seedlings (14 families) planted out in August from the April planting gave a total of 8,423 plant seedlings available for selection during July, 1949. In addition some 9,300 first ratoon seedlings will also be available for selection. These latter were partially selected in the plant crop last year. At Babinda 2,322 setts, representing 1,161 new seedlings, were planted during July without irrigation. At Bartle Frere, where the planting was made, droughty conditions again prevailed during the spring and early summer. Despite this the seedlings made fair growth and will be ready for selection during July, 1949. Twenty-three families were represented in the planting. At Mackay two batches of seedlings were again planted out. On the Experiment Station 6,724 seedlings representing 59 families were planted whilst on the alluvial soil at Lansdowne road the planting consisted of 2,083 seedlings representative of 25 families. Seedlings were planted in the field at Bundaberg during late October and early November. Forty-eight crosses were represented in the total of 5,616 seedlings planted out.

Selections from the previous year's original seedlings at Meringa yielded 86 varieties, which were planted in 40-sett plots. These included 12 selections made purely for use as parents. At Babinda 27 selections were made, whilst at Mackay the Experiment Station seedling selection yielded 76 varieties and the Lansdowne Road planting a further 24 varieties. The number of varieties selected from original seedlings at Bundaberg was 80. At each station the selections were planted out in 40-sett plots as at Meringa.

As usual selections were made from 40-sett plots at all stations during 1948. At Meringa 28 varieties were selected and planted in a yield-observation trial during September. With the exception of two varieties which germinated poorly they made good growth, but will not be selected until the first ratoon crop in 1950. At Babinda five selections were made from the 25 30-sett plots for planting in a small yield-observation trial during July, while 26 seedlings were selected from 40-sett plots at the Mackay Experiment Station and were planted out during September. At Bundaberg 36 selections were made and the yield-observation trial planted during August.

The "G" series seedlings harvested at Meringa during 1948 as a plant crop produced a number of promising canes and the ratoon crop will be watched with interest. At least two of the varieties show considerable promise of high yields with a good sugar content. An interesting point is that several of the most promising varieties are of the cross Korpi x C.279, which contains one-quarter *S.robustum* blood. Of the 20 "G" seedlings in the yield-observation trial at Mackay five gave yields comparable with or better than that of the standard Q28. The ratoon performance and disease resistance of these varieties this year will determine their fate. Ten of them were also planted out for observation on a heavy soil type. There were no "G" seedlings at Bundaberg.

Three "F" seedlings were selected from the ratoon yield-observation trial (planted 1946) at Meringa and these were planted with Trojan as a standard in a randomised plot. At Mackay five "F" seedlings were selected from the ratoon yield-observation trial and planted in a randomised trial with Q28 and Q50 as standards. The "F" seedlings at Bundaberg were selected from a plant yield-observation trial which was somewhat drought-affected during its early life. Ten of the varieties were considered worthy of selection and were planted out in a replicated trial.

The "E" series seedlings planted in a randomised plot at Meringa during 1947 gave an excellent yield in the plant crop. However, the standard Trojan produced the heaviest crop with 43 tons per acre and a c.c.s. of 18.5. Two of the "E" varieties produced a yield closely approaching this and they will be propagated further. One "E" variety in the Mackay yield-observation trial outyielded all others and also the standard, whilst two of the remaining "E" varieties gave yields comparable with the standard. The performance of the ratoons of this trial will be watched with interest. There were no "E" seedlings at Bundaberg.

Due to the development of unfavourable characteristics when planted out on a commercial scale all "D" seedlings at Meringa and Mackay have now been discarded. At Bundaberg a plant randomised trial was harvested in which several of the varieties gave yields comparable with that of the standard Q49, and their relative merits will be further judged on their ratoon behaviour. One "B" seedling is still undergoing tests at Mackay and also one at Bundaberg. In both districts the seedlings have given yields comparable with the standards for the district and they will be tested further on a commercial scale. All "B" seedlings at Meringa have been discarded.

The following notes refer briefly to the performance of some of the newer varieties in the Northern, Central and Southern Districts:—

Northern Districts.

Pindar.—This C.S.R.-bred variety has been propagated as rapidly as possible. It germinates and ratoons well, produces heavy crops on most soil types and has shown some value as an early maturer. It is resistant to both leaf scald and downy mildew, but is inclined to show distress during dry spells.

Q49 has shown no promise in North Queensland except at Mossman where it has grown particularly well. It appears very resistant to grub attack and is worth a trial in the parts of the Mossman district where P.O.J.2878 produces good crops.

Q50 has produced good crops on the poorer lands of the Northern districts. On medium to good soils it lodges badly, but in regions of poor growth it remains erect and produces generally heavier crops than the present standards for those soils. *Q50* has shown good sugar content and its rapid germination and good early cover will appeal to farmers particularly for late planting. It was approved for planting in portion of the Mulgrave Mill area during 1949.

Central Districts.

Pindar has shown fair growth in the Mackay District whilst its sugar content has been generally good. On the wetter farms of the area it should be a useful variety, but in the drier sections it will probably suffer too much from drought to be of value.

Trojan is producing good crops on the river soil types and it may largely replace P.O.J.2878 in those areas.

Southern Districts.

Co301.—The unsatisfactory sugar content of this variety has limited its usefulness and it is only approved for planting in the Isis district.

Pindar produced good crops in the Bundaberg district when grown under irrigation, but its susceptibility to drought would probably limit its value on farms where irrigation is not practised. Tests indicated that its sugar was good early in the season, reaching a peak about September.

Q50 has been propagated to the extent of the available planting material. It is producing good crops with a satisfactory sugar content.

Trojan is yielding well in propagation plots on irrigated farms. It was approved for planting during 1949 in the Rocky Point Mill area, and may be a satisfactory standover cane in the Moreton district.

Varietal Statistics.

The varietal composition of the 1948 crop is shown in Table IX, which presents the tonnage crushed and the percentage of each variety grown in the four main districts and in the whole of Queensland. The total 1948 crop exceeded that of 1947 by no less than 2,282,569 tons of cane and greatly increased crushings occurred in most districts. Particularly was this so in Mackay and Proserpine, where the 1948 crop was two and a-half times greater than that of 1947. The smallest increase was shown in the Giru and Burdekin district, which is not surprising since the crops in that area fluctuate less owing to the large proportion of the crop which is grown there under irrigation.

Once again a critical analysis of the position held by the major varieties grown in the state shows considerable changes. Badila fell from 28.3 to 18.7 per cent. of the crop whilst Trojan offered a close challenge with 16.4 per cent. For the first time in the district north of Townsville Trojan took the lead with 39 per cent. of the crop against 31 per cent. for Badila. This is the first time for over thirty years Badila has been displaced from its undisputed lead in North Queensland. On present figures it appears that next year Trojan must beat it for the position of leading variety in the State. The major strongholds of Badila are now the Burdekin district, where it provided 47 per cent. of the crop, and the Innisfail-Tully section of the north of Townsville district. Due to the excellent crops in the central districts, Q28 again assumed third position in the State with 14 per cent. of the crop, whilst in Mackay-Proserpine this variety contributed 52 per cent. of the total. Fourth position was filled by C.P.29-116, which provided 59 per cent. of the crop for Bundaberg and South and 12.8 per cent. of the State crop. P.O.J.2878 reached fifth place on the list but dropped from eight per cent. in 1947 to 5.7 per cent. in 1948. This variety waned somewhat in popularity both in the central and southern districts. Comus showed a marked rise from tenth position to sixth position with almost 100,000 tons produced at Mackay in addition to substantial tonnages in both the Burdekin and far northern districts. E.K.28 showed a slight decline in percentage but reached seventh position, whilst Q44 rose from ninth place to eighth, thereby displacing both Co.290 and H.Q.426. The latter variety showed a considerable decline in popularity and dropped from seventh position down to tenth on the list. Other significant changes were the advance of Q50 from thirty-eighth position to fifteenth and Q49 from seventeenth to twelfth, whilst Pindar jumped from forty-third to twenty-fourth place. Decline in popularity was shown by S.J.4, which fell from eleventh place to sixteenth, due largely to its replacement in the Mossman district by gum-resistant varieties. Pompey dropped from sixteenth place to twenty-fifth, Q25 declined from twentieth to twenty-sixth, and Q10 from twenty-sixth to thirty-third.

The most meteoric rise predicted for the 1949 crushing is that of Q50, which, from the fact that some 15,000 acres were planted during 1948, should achieve at least sixth place in the 1949 harvest.

Queensland-bred canes increased their percentage of the composition of the crop as shown in Table VII. For the first time they reached over 50 per cent. of the total harvest, and this was due mainly to an increase in the crops of Comus, Q28, Q44, Q49, Q50, and Trojan; the latter indeed topped the one million ton mark. The percentage of varieties of Queensland origin is expected to increase still further in 1949 with the further propagation of Pindar and Q50. Trojan will figure largely in future crushings of the Burdekin district, whilst Q50, in addition to its popularity in Mackay, is expected to extend rapidly in the Bundaberg district and parts of the far north.

With the decline in plantings of Badila, New Guinea representation fell to 18.7 per cent. of the total, whilst U.S.A. varieties represented by C.P.29-116 displaced Javanese varieties, comprising mainly of P.O.J.2878 and E.K.28, for third place. The Indian varieties Co.290 and Co.301 provided 2.9 per cent. of the crop, whilst Mauritius, West Indies, and Fiji varieties together accounted for less than three per cent. of the total.

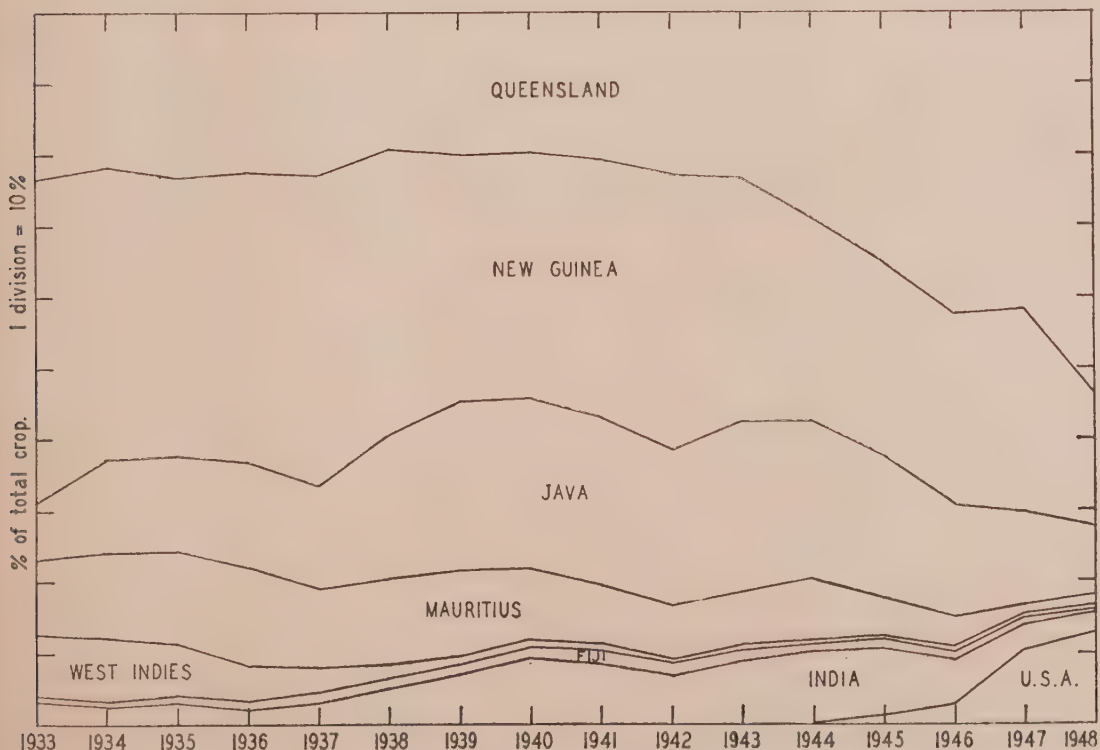


FIG. 5—Showing the composition of the crop on the basis of country of origin from 1933 to 1948.

TABLE VII.—COMPOSITION OF 1948 CROP ON BASIS OF COUNTRIES OF ORIGIN.

Country of Origin.								Tonnage Harvested.	Per Cent. of Crop.
Queensland	..	..	..	..	..	..	..	3,438,833	53.5
New Guinea	..	..	..	..	..	..	..	1,200,841	18.7
U.S.A.	..	..	..	..	..	..	..	821,928	12.8
Java	..	..	..	..	..	..	..	625,111	9.7
India	..	..	..	..	..	..	..	189,179	2.9
Mauritius	..	..	..	..	..	..	..	98,096	1.5
West Indies	..	..	..	..	..	..	..	36,662	.6
Fiji	..	..	..	..	..	..	..	22,851	.3
								6,433,501	100.0

TABLE VIII.—LIST OF CROSSES MADE DURING 1949 SEASON.

Badila	..	..	..	Co.290, G.269, G.282, H.Q.409, I.208, Korpi, 39M.Q.832, Q.28, Trojan, Uba Marot
Cato	..	..	..	I.204, J.B.3, Q.27, Trojan
Co.270	..	..	..	Badila, H.Q.409, J.B.3, Korpi, M.1900S., Q.27, Q.34, Trojan
Co.281	..	..	..	P.O.J.2878
Co.290	..	..	..	Badila, P.O.J.2878, Trojan
E.247	..	..	..	G.269
Eros	..	..	..	P.O.J.2878, Trojan
G.297	..	..	..	Badila
G.323	..	..	..	Badila, Korpi
G.326	..	..	..	Badila, Korpi
H.Q.409	..	..	..	Badila
I.207	..	..	..	Badila, Korpi
I.209	..	..	..	Badila, Korpi
I.210	..	..	..	Badila, Korpi
I.211	..	..	..	Badila, M.1900S.
I.284	..	..	..	Eros, 39M.Q.832, Trojan
J.B.4	..	..	..	Trojan
Korpi	..	..	..	A.130, Badila, C.278, Co.301, Comus, G.269, G.282, I.204, I.207, I.208, P.O.J.2878, Trojan, Uba Marot, S.J.2
39M.Q.832	..	..	..	Badila, H.Q.409, P.O.J.2878
Orion	..	..	..	G.269, I.208, Q.31
Pindar	..	..	..	Badila, Comus, G.269, G.282, H.Q.409, I.208, J.B.3, 39M.Q.832, P.O.J.2878, Q.27, Q.32, Q.34, Trojan, S.J.2
P.O.J.100	..	..	..	H.Q.409, Q.34
P.O.J.2725	..	..	..	Co.281, Co.290, Eros, H.Q.409, P.O.J.2878, Trojan
P.O.J.2875	..	..	..	Co.290, H.Q.409, Q.34
P.O.J.2878	..	..	..	Co.281, Co.290, Eros, 39M.Q.832, S.J.2
Q.27	..	..	..	Co.290, I.208, Trojan, S.J.2
Q.28	..	..	..	Badila
Q.44	..	..	..	Co.290, Eros, I.204, J.B.3, Q.27, Trojan
Q.50	..	..	..	Badila, Eros, J.B.3, M.1900S., 39M.Q.832, P.O.J.2878, Q.27, Q.34, Q.39
Q.52	..	..	..	Q.27, Q.33, Trojan
S.J.2	..	..	..	C.278, G.269, Trojan, Uba Marot, Korpi, Pindar, P.O.J.2878, Q.27
Trojan	..	..	..	Badila, Co.290, Eros, I.206, J.B.3, Korpi, Q.27, Q.33
Uba Marot	..	..	..	Badila, M.1900S., Q.33

TABLE IX.—VARIETAL COMPOSITION AND DISTRIBUTION IN THE FOUR MAIN DISTRICTS AND THE STATE AS A WHOLE : 1948 CROP.

Variety.	North of Townsville.		Giru and Burdekin.		Proserpine and Mackay.		Bundaberg and South.		Whole State.	
	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.	Tons.	Per Cent. Crop.
1. N.G.15	789,614	30.8	386,868	47.1	23,800	1.4	..	..	1,200,282	18.7
2. Trojan	1,011,617	39.5	27,790	3.4	18,646	1.1	204	..	1,058,257	16.4
3. Q.28	..	..	69	..	870,777	52.2	36,168	2.6	907,014	14.1
4. C.P.29/116	..	..	..	..	..	..	187,290	59.4	821,928	12.8
5. P.O.J.2878	14,439	0.6	6,601	0.8	159,663	9.6	..	13.5	367,993	5.7
6. Comus	71,825	2.8	71,195	8.7	99,915	6.0	..	..	242,935	3.8
7. E.K.28	..	..	129,563	15.8	96,759	5.8	..	..	226,322	3.5
8. Q.44	207,383	8.1	..	..	20	..	..	..	207,403	3.2
9. Co.290	..	..	..	..	113,798	6.8	74,375	5.4	188,173	2.9
10. H.Q.426	107,343	4.2	17,454	2.1	22,313	1.3	..	..	147,110	2.3
11. Eros	145,397	5.7	24	..	..	..	..	..	145,421	2.3
12. Q.49	..	..	..	..	..	..	136,756	10.0	136,756	2.1
13. S.J.16	..	..	111,983	13.6	..	..	..	..	111,983	1.7
14. M.1900S.	..	..	..	..	93,296	5.6	4,791	0.3	98,087	1.5
15. Q.50	..	..	..	..	90,686	5.4	10	..	90,696	1.4
16. S.J.4	66,357	2.6	7,925	1.0	..	..	..	..	74,282	1.1
17. Cato	73,904	2.9	..	..	45,855	2.8	..	..	73,904	1.1
18. Q.45	..	..	..	..	..	..	42,688	3.1	45,863	0.7
19. Q.42	..	..	..	..	..	..	..	..	42,688	0.7
20. B.208	..	..	32,499	4.0	5,135	0.3	..	..	32,499	0.5
21. S.J.2	..	..	25,662	3.1	..	..	30,944	2.2	30,944	0.5
22. Q.47	..	..	..	..	17,378	1.0	5,640	0.4	25,518	0.4
23. P.O.J.2725	1,164	0.05	..	..	..	..	..	..	24,101	0.4
24. Pindar	2,500	0.1	..	..	..	..	..	..	22,851	0.4
25. Pompey	24,101	0.9	..	..	..	..	21,128	1.5	21,128	0.3
26. Q.25	22,851	0.9	..	..	..	..	13,217	0.2	13,217	0.2
27. Orion	13,217	0.5	..	..	..	..	10,418	0.8	10,418	0.2
28. Q.48	..	..	..	..	6,516	0.4	1,131	0.1	7,659	0.1
29. Q.813	12	..	..	..	550	..	3,817	0.3	3,817	0.1
30. Atlas	3,118	0.1	..	..	1,180	0.1	..	..	3,668	0.1
31. D.1135	..	..	2,246	0.3	..	..	2	..	3,428	0.1
32. P.O.J.2714	2,176	0.1	..	..	..	..	1,899	0.1	2,176	..
33. Q.10	..	..	..	..	..	..	1,850	0.1	1,899	..
34. Vesta	..	..	..	..	..	..	1,387	..	1,850	..
35. P.O.J.213	1,387	0.1	..	..	..	..	1,006	0.1	1,387	..
36. H.Q.409	..	..	..	..	..	..	..	..	1,006	..
37. Co.301	..	..	582	0.1	20	..	..	..	602	..
38. Q.20	..	..	..	..	..	..	..	..	495	..
39. B.147	495	..	..	..	..	..	277	..	374	..
40. Oramboo	97	..	..	..	..	..	..	..	326	..
41. Q.2...	326	..	..	..	..	..	318	..	318	..
42. Q.52	..	..	..	..	..	..	222	..	222	..
43. Akbar	..	..	..	..	..	..	497	..	4540	0.1
44. Others	2,964	0.1	207	..	872	..	..	..	..	..
Totals	2,562,287	..	820,668	..	1,667,179	..	1,383,367	..	6,433,501	..

Report of the Division of Entomology and Pathology.

By R. W. MUNGOMERY, Officer in Charge.

Taken by and large, there were no heavy widespread losses during the 1948-49 season as a result of diseases or the activities of pests, and the heavy crop anticipated for the 1949 harvest reflects in some measure this freedom from any serious visitation. In a few mill areas, however, grubs did stage another come-back and caused some damage, while supplies of benzene-hexachloride were still not equal to the demand; but now that several firms have entered this field of production, resulting in a stepping-up of supplies and a keener competition for markets, there seems every justification for assuming that growers will no longer have any excuse for allowing a perpetuation of this kind of damage, and ample stocks should be available to fulfil all requirements during the current year.

With the rapid advance in methods of pest suppression and the gradual improvement in disease control that has been maintained over the past few years, the point was fast being approached when certain diseases and pests were being relegated to positions of less concern in some districts, and this was allowing a greater concentration of effort against others whose control was proving more difficult. As an instance of this progress, one may cite gumming disease which, as far as is known, disappeared from commercial plantings in Queensland with the destruction of diseased ratoons in the Mossman area last year, and as a result it was possible to afford some relief from the terms of the quarantine previously imposed in that area by permitting plantings of susceptible varieties on farms considered to be reasonably safe.

In the midst of this improving situation it was rather disturbing to be faced firstly with a resurgence of downy mildew disease in the Hambledon area, which now happily seems to have been brought under effective control, and secondly with the fact that the so-called Q.28 trouble or ratoon stunting was really due to a hitherto undetected disease. Although the causal agent of this Q.28 trouble has still not been determined, experimental proof was established that the disease is readily transmissible under certain conditions. Nevertheless, even though it had not been positively identified as a disease earlier, the measures previously adopted for circumventing this trouble followed closely along generally accepted lines of disease control, and as a result the position had never been allowed to get out of hand. Restrictions recently enacted by legislation (Proclamation No. 20) prohibiting the use of diseased or suspect planting material, together with other proposed lines of attack, will ensure a more positive control of this disease, which is discussed more fully elsewhere. Consequent on the recognition of ratoon stunting or Q.28 trouble as a new cane disease it became necessary to add it to the schedule of diseases proclaimed under "*The Sugar Experiment Stations Acts, 1900 to 1948.*" At the same time opportunity was taken to revise the schedule of diseases and insects to bring them in line with the accepted present-day nomenclature.

The only other legislation enacted during the year which had a direct bearing on disease control was the quarantining of portions of the Millaquin-Qunaba mill areas. In this section restrictions were imposed on the removal or planting of P.O.J.2878 in an effort to speed the disappearance of downy mildew disease from that area.

The usual annual conference of Cane Pest and Disease Control Boards, which was held in Mackay on 6th April, 1949, was attended by forty delegates, representing eighteen different Boards. In addition, twelve Bureau officers attended in an advisory capacity. At the outset the constitution was amended to permit discussion on all matters coming within the ambit of the "Powers and Duties of Cane Pest and Disease Control Boards." Previously matters relating to diseases were not discussed, this apparent anomaly was a legacy from the days when Pest Boards and Disease Control Boards functioned as separate entities, so that when the constitution was originally adopted it covered only the operations of Pest Boards. However, with their amalgamation some years ago, the need for widening the scope of these discussions became apparent. Now that this has been effected, future conferences should prove of greater interest to southern Boards, which up to the present have been concerned mainly with the control of diseases.

Subjects for discussion at this recent conference included the latest developments in cane grub and wireworm control by means of benzene hexachloride, whilst information on some of the newer rodenticides was made available. Board supervisors also took the opportunity to witness the effects of Q.28 trouble, and this firsthand knowledge should prove invaluable in keeping these officers on the alert for any appearance of this disease in their respective spheres of operation.

The status of the various pests and diseases, as well as the experimental work associated with each one, is set out in greater detail under the following separate headings:—

The Greyback Cane Beetle. (*Dermolepida albohirtum* Waterh.).

The spring and early summer of 1948 proved fairly dry throughout North Queensland but the widespread relief rains which occurred about Christmas were responsible for fairly uniform emergences of greyback beetles, while the subsequent flights were heavier than those of the previous year. The ensuing weather provided optimum conditions for the incubation of the eggs and development of the young grubs, with the result that some of the infestations recorded were the heaviest since 1934. Undoubtedly the most extensive and severe infestations occurred in the

Mulgrave Mill area, where damage began to show up as early as April, 1949. As the season advanced it was apparent that upwards of 3,000 acres there were damaged by this pest, the Meringa, Kamma, Highleigh, and Banna areas being the most heavily infested. Grub damage was also severe in a restricted area along the Port Douglas road, but total losses in the Mossman mill area were small. The pest also asserted itself in the Leach, Long Pocket, and Hawkins Creek areas of the Ingham district whilst localised damage occurred in parts of the Lower Burdekin despite the expenditure there of approximately £800 in collecting beetles. Further south grub damage in the Proserpine mill area was the severest for a number of years, and the North Coast areas of the Mackay district and other portions of the district as far west as Finch Hatton also suffered some damage. In the Calen area the susceptible S.J.2 was the most seriously damaged, this variety having recently made a reappearance there following some years of relief from this pest's activities.

The wet season rains which continued with remarkable regularity throughout the first three or four months of 1949 helped materially in mitigating the damage that otherwise would have developed on an intense scale. On the debit side, however, these rains made the ground so soft and yielding that as soon as the root system had been destroyed whole stools quickly levered themselves out of the ground by their own weight. Fortunately, where this severe damage occurred, arrangements had previously been made for the mills concerned to commence crushing early so as to cope with the large crops offering; consequently this damaged cane was crushed before any serious deterioration could take place. Nevertheless, these infested fields will represent a considerable loss in ratoon cane for 1950 as will be evident from Fig. 6 which shows the profound differences in ratoons resulting from untreated and treated portions of the same field where "Gammexane" (benzene hexachloride) had been applied to the plant crop.

Grub damage increased in intensity and area until the end of June, the last to show up being in ratoon fields that had been dressed with "Gammexane" in 1947 to protect the 1948 crop, but evidently not in sufficient quantities to confer complete protection on the current crop.

Despite the damage inflicted by the pest in 1949, the aggregate losses were not of the same magnitude as those sustained in previous outbreak years. This was undoubtedly due to the fact that growers had already taken steps to protect their crops in the areas more liable to severe infestation, and it is estimated that slightly more than 7,000 acres received dressings of "Gammexane" before the end of December, 1948. It is quite certain that a greater acreage would have been treated had supplies of this insecticide been more freely available during the spring months, and despite all efforts to fulfil orders on time a quantity was delivered too late for application to the 1949 crop. In the light of the dense grub populations that were revealed by surveys in some of the untreated areas, efforts were made to salvage some of these infested crops by fumigating the soil with carbon disulphide. These attempts were mostly successful, and approximately 140 acres were treated in this manner. However, many of the Cane Pest and Disease Control Boards had already disposed of the major portion of their stocks once they realised this fumigant would soon be supplanted by "Gammexane" for cane grub control.

There never seems to have been any serious doubt regarding the efficacy of "Gammexane" for cane-grub control, but had such doubt existed it would soon have vanished after witnessing the fields of cane of excellent green colour which stood out in marked contrast to the surrounding areas of recumbent or uprooted and dying cane which is so typical of grub-smitten crops. These fields were none other than those that had received protective dressings of "Gammexane" during 1948, and no more eloquent tribute could be paid to the usefulness of this insecticide than the fact that the Mulgrave growers, on the score of these successes and the probability of equally heavy infestations occurring next year, recently increased their orders from 80 to over 200 tons. Original orders from a number of other mill areas were also increased in much the same ratio.

Supplies of benzene hexachloride during the current season improved appreciably, and not only was the capacity of some of the original plants increased, but other companies entered the market and commenced the manufacture of 10 per cent. and 20 per cent. dusts. In some cases there was considerable divergence in the type of carrier used, and though this may have been unavoidable because of the scarcity of certain diluents, it did tend to cause bother in calibrating the distributors when dusts from two or more sources had to be applied. In addition, crude benzene hexachloride was being imported from some of the "soft" currency countries in Europe, and it was expected that this year's demand for approximately 850 tons of 10 per cent. dust, or the equivalent, will have been met by the end of November, *i.e.*, in sufficient time to treat all areas for which provision was made.

Results of Benzene Hexachloride Experiments.—Some of the plant crop trials which were harvested this year gave highly significant results, and if they are judged solely on the basis of affording protection for one season some of the treatments at the rate of 75 lb. of 10 per cent. dust per acre gave satisfactory control. However, one very heavily infested 12 x 4 plant cane trial in the Kamma area developed some wilting and yellowing of foliage in the 75 lb. plots, while the 100 lb. and higher treatments were undamaged. This visible injury was not accompanied by loss of tonnage yield, possibly because the damage did not show up until early June and the cane was harvested early in July. Still, the harm inflicted may have been sufficient to affect the later growth had it been necessary to delay harvesting until late in the year. It would seem therefore that 75 lb. per acre is not always adequate in cases of heavy infestation: this observation should be of importance to Burdekin growers, several of whom frequently grow only plant crops.

Experiments involving re-treatments happened to be located on farms where the density of grub infestations was insufficient to produce clearcut results. For that reason direct comparisons could not be made between treatments spread over the plant and first ratoon crops as against the equivalent quantities applied as single dressings to the plant crop, and a proper evaluation of these two methods of treatment must now await the outcome of current trials. However, supplementary dressings at rates of 40 lb. and 50 lb. per acre which were made by growers to fields treated in 1947 demonstrated the value of these re-treatments, particularly in view of the fact that where no "booster" dressings were applied some 80 lb. and 90 lb. treatments broke down to a marked extent in the second year.

The earlier experimental plots which fortunately were established in some of the heavily infested areas yielded some very important information; probably the most enlightening of these trials was one which embraced portion of a field in the Mulgrave area which was growing a crop of second ratoons. In this case the plant crop had been treated with "Gammexane" at different rates in November, 1946, and without the addition of any supplementary dressings whatsoever the residual toxicity proved such that the original treatments of 200 lb. and 150 lb. of 10 per cent. dust per acre were sufficient to prevent any grub damage developing, and they gave yields of 20.71 and 20.1 tons per acre respectively. On the other hand, considerable damage developed in the 100 lb. plots which yielded 17.71 tons, while the control plots suffered severe damage and averaged only 10.18 tons per acre. Although there was no significant difference between the 200 lb. and 150 lb. treatments, both of these showed highly significant superiority over the 100 lb. treatment, which in turn was significantly greater than the control at the 1 per cent. level. Fig. 7 shows the pronounced difference between the 150 lb. treatment and an adjacent control plot in this trial. Complete details for the three crops harvested during the course of this experiment are given hereunder:—

Treatment Rates lb. per Acre of 10 Per cent. "Gammexane" Dust.					Plant Crop Harvested 12-11-47.		First Ratoon Crop Harvested 16-8-48.		Second Ratoon Crop Harvested 29-6-49.		Total Crop, t.p.a.
					t.p.a.	C.C.S.	t.p.a.	C.C.S.	t.p.a.	C.C.S.	
0	..	..	..	..	27.04	16.7	27.51	15.7	10.18	13.5	64.73
100	..	..	..	..	28.09	16.2	34.13	15.2	17.71	14.6	79.93
150	..	..	..	..	28.83	16.6	35.78	15.5	20.1	14.4	84.71
200	..	..	..	..	28.82	16.2	34.9	15.8	20.71	14.7	84.43

Although the 150 lb. treatment showed an increase of approximately 20 tons per acre over the untreated plots during the three-year period, this amount should not be regarded as the maximum difference obtainable in a trial of this nature, for whenever grub damage was severe, harvesting was carried out during the early part of the season before any serious deterioration had occurred in the control plots. Furthermore, the controls were favoured to the extent that the heaviest infestation occurred at the end rather than at the commencement of the cropping cycle.

Another trial confirmed the fact that a dressing of 150 lb. of 10 per cent. dust per acre applied to the plant crop will, without any re-treatment whatsoever, persist in the soil at a degree of toxicity sufficient to cope with any grub infestations that may develop during the full period of a normal cropping cycle. Below this level some damage was apparent. Insurance against grub damage can therefore be obtained at a relatively cheap outlay equivalent to considerably less than the value of one ton of cane per acre per year. When it is realised that the indifferent control obtained with carbon disulphide in past years cost over £10 per acre, to say nothing of the labour difficulties involved, it will be apparent just what progress has been made during the past four years in the control of this, the principal sugar-cane pest in Queensland.

Miscellaneous "White Grub" Pests.

Fairly dense flights of "frenchi" beetles (*Lepidiota frenchi* Blkb.) and other two-year cycle Scarabaeids took place towards the end of December, 1948, and with the occurrence of some damage in the Mossman, Cairns, and Mackay districts there was some evidence of a build up by these pests. Unfortunately, the sites of various trials did not coincide with the areas where the heaviest infestations occurred this year, and as a consequence it was not possible to issue precise recommendations for the control of these pests by means of benzene hexachloride. However, it is confidently expected that they will ultimately yield to this insecticide. Efforts against these species were therefore redoubled by the establishment of a further series of field trials which were designed to provide information on the optimum placement of the insecticide and the most economic treatment rate.

In the Hambleton area there was evidence that amounts between 50 and 150 lb. of 20 per cent. dust per acre (or the equivalent) applied in furrows on either side of the plant cane after stooling would prevent frenchi damage in the subsequent first ratoons, but there was no clear indication as to which was the optimum rate. It is possible that the amount recommended for greyback grub control on a three-crop basis will go a long way towards controlling frenchi grubs. It will simplify matters considerably if the two species can be controlled by the one treatment, particularly since both of them often occur together in the same field. Since the announcement this year of an appreciable reduction in the price of the 20 per cent. dust, dressings at the higher rates are now within the economic limit.



Fig. 6.

Differences in ratoon vigour following application of "Gammexane" (benzene hexachloride) to the plant crop. Cane on the right received "Gammexane" on the plant crop while that on the left was untreated.



Fig. 7.

Persistence of toxic effect on cane grubs in a second ratoon crop in the Mulgrave area in June, 1949. Cane on left received 150 lb. of 10 per cent. "Gammexane" dust per acre in November, 1946, and was not further treated. The cane on right was not treated.



Fig. 8.

Illustrating successful wireworm control in the Mackay area using 20 lb. of 10 per cent. "Gammexane" dust per acre mixed with fertilizer and applied to drills at planting time. Photograph shows alternating strips of treated and untreated rows.

In the Bundaberg district grubs of *Pseudoholophylla furfuracea* Burm. and *Lepidiota consobrina* Lea. were seen more plentifully and spotty damage was reported from the South Kalkie, Springfield and Gooburrum areas, whilst localised dense populations occurred in part of the Qunaba area. In the Isis district grubs were again active though damage was not extensive, and for that reason trials with benzene hexachloride yielded nothing definite. Nevertheless, it appears likely that any results secured in North Queensland with the insecticide against *L. frenchi* will almost certainly be equally applicable to *P. furfuracea*.

Wireworms (*Laeon variabilis* Cand.).

Work carried out during the past season in the Mackay district again demonstrated the efficacy of benzene hexachloride-fertiliser mixtures in affording the germinating setts complete protection against wireworm attack. In the earlier investigations care was taken to keep the mixture from coming in direct contact with the setts owing to the fear that the insecticide might inhibit the development of roots and thus cause stunting and loss of tonnage. However, in the more recent experiments no special care was taken to prevent the mixture from coming in partial contact with the setts, and the same complete protection was obtained with no significant decrease in crop. This method, which involves the application of 10 lb. of 20 per cent. benzene hexachloride with 3 cwt. of fertiliser per acre at the time of planting, has now been adopted as standard practice for the prevention of wireworm damage, and over 3,000 acres were treated in this manner in the Mackay-Proserpine area last year. Wireworm infestations during the winter plantings were extensive although not heavy, but even under these conditions the benzene hexachloride-fertiliser mixtures produced some outstanding successes, as will be evident by referring to Fig. 8.

A number of fields were also successfully treated in the Ingham area, where wireworms gave some trouble, whilst in the Cairns-Mossman area a further 800 acres were treated. This latter acreage does not reflect the true extent of wireworm damage in these far northern areas as it is considered that other factors besides wireworms were responsible for the poor strikes previously recorded on some of the treated fields.

Miscellaneous Insect Pests.

Infestation of cane by the weevil borer *Rhabdoscelus obscurus* Boisd. was at a very low level again, presumably owing to the continued practice of burning practically all cane prior to harvesting, and to the absence of any serious outbreaks of top-rot.

The mound-building ant, *Aphaenogaster pythia* Forel, caused some stunting at Tully by burrowing the soil at the base of the cane stools. An attempt was made to test the value of various chlorinated hydrocarbons in checking this pest's activities, but an unexpected, heavy mortality in both treated and untreated plots obscured results. Similar investigations are planned against "earth pearls," *Margarodes* sp., which were observed to be present in canefields at Nikenbah. The sugar cane scale, *Aulacaspis madiunensis* Zehnt., was also seen on standover Q.47 in the Qunaba area, and, in view of the serious damage previously inflicted on the variety P.O.J.213, it is evident that in the development and testing of new standover varieties consideration will have to be given to the possible effects of this insect.

Animal Pests.

Reports indicated that rat damage had increased somewhat over that of the previous year, but although rats were present in small concentrations on alluvial flats and other favoured areas their increase was in no way suggestive of an approaching plague. Extensive baiting campaigns were maintained in most mill areas, and the chief monetary losses were those incurred through the nuisance of having to handle damaged cane.

Experimental work involving the evaluation of two new rodenticides, "1080" and "Castrix," was completed during the year and both were shown to be efficient rat poisons. "Castrix" was considered unsuitable for use in canefields whilst "1080" was not as satisfactory as yellow phosphorus-paste on bread for use as a snap bait. On the other hand, "1080" did show promise of being a suitable replacement for the more expensive thallous sulphate in packeted wheat baits. However, because of the extremely dangerous nature of this compound and the fact that there is no known antidote for it, no firms have so far been prepared to manufacture "1080" poisoned wheat baits, nor have Cane Pest and Disease Control Boards evinced any great interest in them. There has been a growing tendency to favour thallous sulphate baits in preference to those made with zinc phosphide, and now that the former chemical is available from non-dollar countries, continuity in supplies should be assured.

Considering the dry conditions that prevailed in the latter part of 1948 in the Mackay district complaints of wallaby damage to cane were remarkably few, and the actual losses were small. In that area the number of scalps on which bonuses were paid fell from over 9,000 in 1947 to under 4,000 in 1948. Beagle hounds continued to do good work in the Burdekin, and favourable reports of their activities were also received from the Highleigh area, where they were credited with having driven wallabies away from the fields where they had formerly been a nuisance.

Pigs, too, proved difficult to cope with, particularly in view of the continued scarcity of locally produced wire netting, whilst the exorbitant price of the imported product rendered its use on any large scale almost prohibitive. Their numbers were being kept in check to some extent by shooting and the payment of substantial bonuses.

There was no noticeable diminution in the numbers of hares and foxes seen in the vicinity of South Queensland canefields, and fox damage in one plot of Q.50 was quite extensive. It is to be hoped that the same partiality is not shown towards this popular new variety as was shown by these animals towards H.Q.285 some years ago.

Fiji Disease.

There was a general decrease in the amount of Fiji disease found during the past year in all affected areas. At Maryborough, where the disease caused severe losses in tonnage in varieties such as M.1900 Seedling fourteen years ago, it was found on only three farms during 1947-48 and this year only a single diseased stool was rogued. It occurred in a block which will be ploughed out after harvest this spring. At Rocky Point, the smallest mill area in Queensland, situated to the south of Brisbane, 91 diseased stools were found in the 484 acres inspected.

In the Moreton mill area, 3,342 diseased stools were rogued from 4,514 acres, continuing the decline from the 1944-47 peak noted last year. The numbers of diseased stools rogued since operations commenced in 1938 are plotted in Fig. 9 together with the proportion of the mill crop yielded by the variety P.O.J.2878. This shows that, in the early years, as the percentage of P.O.J.2878 increased so did the number of diseased stools found, but when after reaching a peak in the years 1941-42 and 1942-43 P.O.J.2878 commenced to decline, the line showing the amount of Fiji disease did not follow downwards. Instead, it continued to increase and in 1944-45 made a sudden jump to an all-time high of 10,800 stools, remaining in that vicinity for the following two years. It was apparent that, although some disease was being found in the new variety C.P.29/116, it was not being kept in check in P.O.J.2878. With the full agreement of the growers' organisations, plantings of P.O.J.2878 were prohibited by proclamation last year, and the variety was removed from the list of varieties approved for planting in 1949. Despite the many special difficulties in controlling the disease in the Moreton area, it is felt that with the replacement of P.O.J.2878 by C.P.29/116 and the newer varieties such as Vesta and Q.47, a continuation of the roguing and the control of sources of plants will keep the disease in check.

In the Bundaberg district, 1,015 diseased stools were found in 10,597 acres inspected, a decrease to less than 50 per cent. of the 1947-48 total. Of this total 563 stools were found on Bingera Plantation, where irrigation yields heavier crops, and favours more rapid spread of the disease, than in the rest of the district. It has been agreed that the varieties P.O.J.2878, P.O.J.2725, and Q.25, all of which are susceptible, will not be planted on this plantation at the moment and a continued reduction in the amount of disease is expected. The history of Fiji disease in the Bundaberg district (Fig. 9) shows a rise and fall roughly corresponding to the varying popularity of the variety P.O.J.2878. The number of diseased stools found showed a steady increase until the 1943-44 season; the next year there was a marked increase due to the findings in two outbreaks which had obviously been getting more serious for some time before their discovery; thereafter the decrease in Fiji disease closely followed the decline in P.O.J.2878.

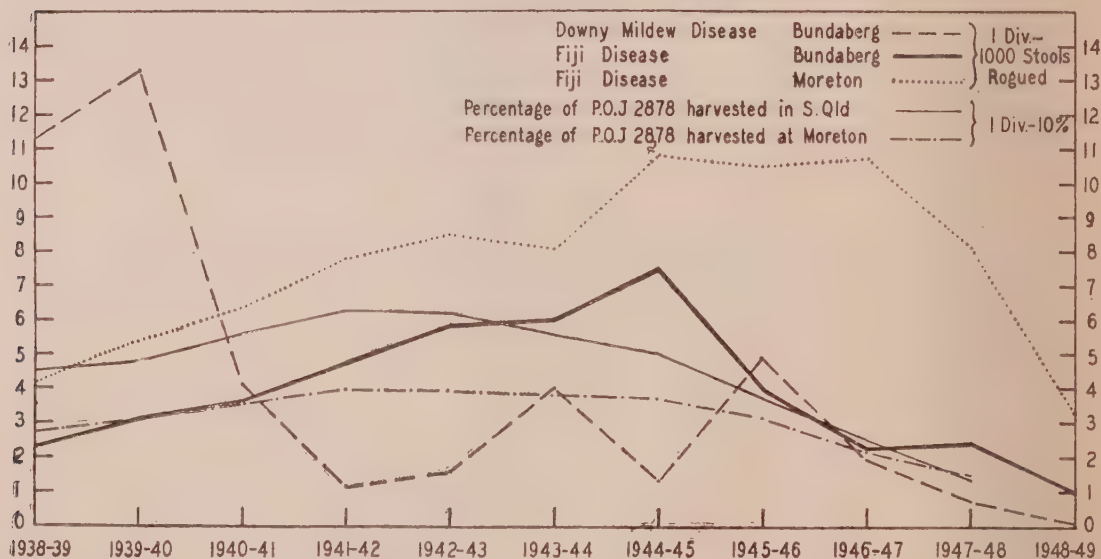


FIG. 9—Graph showing relationship between number of diseased stools rogued and percentage of P.O.J.2878 harvested in South Queensland districts.

The Fiji disease resistance trial which was planted in the spring of 1947 did not develop sufficient disease to enable conclusions to be drawn and it will have to be grown into the second ratoons. Both it and the current trial, now a plant crop, contain for testing promising seedlings and named canes.

Chlorotic Streak.

Chlorotic streak disease still remains a problem in the wetter northern areas and at Moreton in South Queensland. With our present knowledge of the disease the best hope of minimising losses is the use of clean plants brought in from the drier areas; some farmers have adopted this practice but where the disease occurs over large areas its implementation on a district-wide basis presents many difficulties.

Yield trials harvested during the year under review included a ratoon trial at Babinda as well as ratoon and plant trials in the Moreton area. The trial at Babinda included the variety Badila in a series of plots planted with chlorotic streak-diseased and healthy material. The plant

trial did not yield significant results and although the yields from the ratoon plots followed the same pattern as those of the previous year, and the average production of 30 tons per acre was slightly better than in the plant crop, some significance could be attached to the results. Yields from diseased and healthy plots were much the same over the series of soaked setts, diseased setts, and untreated setts, but statistical examination showed that treated-diseased setts gave significantly greater yields than soaked-diseased setts, and that healthy-soaked were better than healthy-untreated or diseased-soaked. The results from this trial were not in agreement with previous trials with Badila in North Queensland, when diseased setts gave very much poorer yields than healthy or treated setts, and at present little importance can be attached to the trial as a whole.

The ratoon trial in the Moreton area bore out the results obtained in the plant crop, in which the disease was shown to cause serious losses in the variety P.O.J.2878. The mean values of the yields of cane per acre from each series were as under for both crops :—

	Plant.	Ratoon.	Total.
Healthy—Treated	36.4	19.3	55.7
Healthy—Untreated	34.5	19.6	54.1
Diseased—Treated	33.5	18.1	51.6
Diseased—Untreated	24.1	14.0	38.1

As in the plant crop, all other treatments exceeded the diseased-untreated at the one per cent. level of significance. The losses due to the disease are obvious from an inspection of the figures. As it happened both plant and ratoon yields are lower than the average for this Maroochy River alluvial soil but, judging from observations of the losses due to the disease in very heavy crops on other farms in the same district, much the same proportional losses could be expected in heavier crops.

The one-year plant trial at Moreton was planned to compare the effects of the disease in the varieties Q.47, Q.49, and Vesta. The difference between the yields for the healthy plots and the diseased plots was 6 tons per acre, which was significant at the 5 per cent. level, but, owing to the wide range of plot yields, differences within the one variety were not significant.

Ratoon Stunting Disease or Q.28 Disease.

As previously indicated, the trouble in ratoon crops of Q.28 in the Mackay district which has been apparent over the past few years was found to be due to a transmissible disease. This was deduced from the fact that setts of healthy Q.28 inoculated before planting with juice from diseased sticks of Q.28 produced ratoons showing the typical stunting which is caused by the disease (see Fig. 10), while the ratoons from non-inoculated setts grew normally. Furthermore in other trials planted at the same time using healthy and diseased Q.28 the disease was transmitted from the diseased into the healthy plots by the knives of the cutter-planter. In some instances the disease spread to as many as 50 consecutive stools by this means, whilst odd stools further along the row were infected for a distance of 150 yards (the full length of the trial). The cutter-planter was also responsible for the transference of the disease from diseased Q.28 to Q.50 though present indications point to this variety being less susceptible than Q.28.

To date there has been no evidence of natural spread of the disease from plant to plant growing in the field, nor has there been any positive evidence of the disease being transmitted from the soil to the plant; however, it is possible that under certain conditions the disease may be picked up from the soil. Nevertheless several growers whose crops were affected eliminated all Q.28 and then re-introduced healthy cane of the same variety, with the result that there has been no recurrence of the disease even in fields which previously grew diseased cane. These observations have been limited to the last few years and none of these seasons has been characterised by particularly high rainfall conditions.

Yield trials which were planted in 1947 using both healthy and diseased Q.28 from various sources were harvested in 1948 and the results confirmed the belief that plant crops from diseased planting material produce lighter crops than those from healthy material although the differences are not nearly so pronounced as in the ratoons. Even so the differences in yields from the plant crops of diseased and healthy cane varied from 6 to 10 tons per acre, though c.e.s. differences at the time of harvest were not significant. In actual tonnages the diseased plant crops yielded from 18 to 34 tons per acre while the healthy crops produced from 28 to 40 tons per acre. From this it will be readily understandable that the majority of growers would scarcely suspect anything amiss with their plant crops of diseased Q.28 unless these were growing alongside healthy cane for comparison, and even then small differences would probably go unnoticed unless careful observations were made. However, the differences in the ratoon crops are much more spectacular and Fig. 11 illustrates the first ratoons resulting from healthy and diseased planting material in one of the above-mentioned trials. These ratoons have not yet been harvested and consequently yield figures are not available.

Hot-water treatment of diseased setts at approximately 52°C. for 20 minutes resulted in the apparent curing of some plants while others remained diseased. Further work on this subject,

using various combinations of both higher temperatures and longer periods of treatment, was initiated in an attempt to determine whether all setts can be cured without killing too large a percentage of them, and also whether the curative effect is permanent.

During the past year the presence of this disease was confirmed in the Bundaberg and Maryborough-Bauple districts, where it is fairly widespread in plantings of Q.28. Since this variety never enjoyed very great popularity there, it has been decided to remove it from the list of varieties approved for planting in those districts.

In recent months it was detected in portion of the Proserpine mill area, while in the Mackay district the disease continues as a serious menace to many growers who still have extensive areas planted to Q.28. It is now suspected of being present in some of the newer plantings of Q.50 in that district and it is also possible that it exists in some of the older varieties there, particularly those which produced unexplained poor ratoons within recent years. Farmers have been urged to take all precautions possible to prevent the disease spreading in their crops.

With the co-operation of the Mackay Cane Pest and Disease Control Board a district-wide survey is being conducted to determine as far as possible which farms are affected, whilst Proclamation No. 20, which was recently gazetted, prohibits the removal of plants from diseased or suspect farms and controls the use of planting material on such farms. These restrictive measures and the voluntary reductions in the planting of Q.28 in favour of the more popular Q.50 should assist materially in the control of this disease.

So far the causal agent of the disease has not been isolated, nor has it been seen in microscopic examinations of diseased plants. Further work on various aspects of the disease is now in progress; it includes the hot-water treatment of diseased setts, varietal resistance trials, methods of transmitting the disease, the effect of disinfectants on the causal agent, and a determination of its longevity outside the host plant.

Mosaic Disease.

Mosaic disease was still present on a number of farms in the Burdekin district, although plant selection and roguing carried out by the Supervisors of the Cane Pest and Disease Control Boards reduced its incidence. This is the northernmost limit of its occurrence in any appreciable amount, but further south in the central district it was seen in the Proserpine and Farleigh mill areas, and on a number of creek-bank farms throughout the remainder of the Mackay district. There it caused some damage in S.J.2, Comus, E.K.28, and H.Q.426, but the more popular varieties showed a high degree of resistance. In the Bundaberg district the disease was present in alluvial areas in the varieties Q.25 and Q.42; however, the acreage devoted to these canes is rapidly declining, and though Q.25 is sensitive to infection the overall losses were small. The disease was again noted in Co.301 in the Wallaville district, and in a few stools of Q.50. South of Bundaberg Q.42 appeared to be the main variety affected but insignificant losses resulted. Mosaic increased in both Q.28 and Trojan in the Moreton area and the latter showed some damage; Oramboo, too, was affected in the very small areas still remaining.

During the year a mosaic disease resistance trial was planted at Bundaberg to test promising seedlings from that district. All susceptible standard varieties showed a high percentage of infection in the inoculated plots while most seedlings appeared to be resistant.

Some experimental work was initiated to determine whether different strains of the disease exist in Queensland. Mosaic disease from six different localities and varieties was inoculated by the Sein method into eight varieties of cane, but no differences in symptoms or percentages of infection were observed, and it was concluded that all material collected was affected with the same strain of the disease. However, arrangements have been made to import other test varieties from United States of America, and further attempts at strain differentiation will be made when these varieties have been multiplied sufficiently.

Dwarf Disease.

The Mackay Cane Pest and Disease Control Board carried out inspections and roguing for this disease during the year with the result that 1,025 stools were dug out on 15 farms in the Homebush-Rosella and Walkerston-Palmyra areas. This is a slight decrease on the previous year, but with the further replacement of the susceptible varieties P.O.J.2878, Q.45, Comus, and H.Q.426 by Q.50 a continued decrease of the disease should result.

Downy Mildew (*Sclerospora sacchari* T. Miy.).

For several years past downy mildew disease has been practically confined to one locality in the Bundaberg district and its extinction in the near future as a disease of commercial crops in Queensland was anticipated. However, an outbreak of the disease in North Queensland indicates that its elimination may not be attained without difficulty and that occasional outbreaks may be expected for some years to come. The outbreak was found in late January, 1949, on a farm in the Hambleton area near Cairns. Its origin is unknown. The disease was present on neighbouring farms in 1942 and 1943, but the diseased fields were ploughed out and not a single diseased stool was seen over the intervening years.



Fig. 10.

First ratoon Q.28 on a farm in the Mackay area. Cane on left affected with ratoon stunting disease. Cane on right healthy. The sets for the original planting came from two different sources, otherwise cultivation methods were identical.



Fig. 11.

Portion of a trial showing the differences in yield in the first ratoon crop between diseased and healthy Q.28. Plot on left affected with ratoon stunting disease. Plot on right healthy.



Fig. 12.

Portion of a commercial planting in the Burdekin district showing outstanding differences in germination due to mercurial treatment. The sets in the rows on the right were dipped in .05 per cent. "Aretan" solution prior to planting. Those on left were untreated.

It would appear unlikely that the disease persisted in commercial crops because the varieties grown on these farms for the past few years have been susceptible to the disease and would no doubt have suffered severely from it. The number of diseased stools and their disposition in this outbreak indicates that the source of infection had very recently arisen. It may have come from oospore infection from the soil, from some alternate host plant, or from some unknown source of infection.

The first diseased stools were found in a block of first ratoon Trojan and frequent examinations, increasing to daily inspections, led to the roguing of 71 stools before infection spread to a block of Trojan on the farm adjoining. Another block of the same variety on this second farm was later found to be infected. Fortunately the first site appeared to be the main focus as only eight and two diseased stools were found in the respective blocks on the second farm. The numbers of diseased stools found fell towards autumn and only one stool was found in six weeks during late April and May. A total of 93 stools had been dug out during the period. The ploughing-out of the infected fields, which are contiguous, before growth recommences in spring has been arranged, and it is hoped that this measure, following the close inspection of all surrounding fields, will prevent the disease from spreading. Other control measures adopted include the prevention of the removal of plants from the diseased or neighbouring farms or the use of their own plants except where the fields are more than half a mile from the nearest infection. In addition growers were required to plant resistant varieties within this half-mile radius.

It might be considered that an outbreak involving only 93 stools in three fields is of negligible account, but the fact is that both Hambledon and the adjoining Mulgrave mill areas grow a large proportion of susceptible varieties in which the disease could very easily get completely out of control. The variety Trojan, for instance, which is rated as a susceptible cane yielded 57 per cent. of the tonnage crushed by Hambledon in 1948, and Eros, a highly susceptible cane, occupied approximately 10 per cent. of the plantings.

Downy mildew was not found elsewhere in North Queensland, and in the Bundaberg district in the south continued to decrease. Only 74 stools were found there in the 10,597 acres inspected during the year and not a single diseased stool occurred in crops planted in 1948. As mentioned in this report last year a proclamation was issued prohibiting the planting of P.O.J.2878, except under permit, in the Woongarra section of the Millaquin and Qunaba mill areas; the disappearance of this variety should hasten the elimination of the disease. The story of downy mildew disease in South Queensland within the last fifteen years provides an excellent illustration of how a particular variety or group of varieties can affect the disease situation. In 1933 downy mildew was known to be present in the district, but was not an important disease in the varieties then grown. That year, however, marked the beginning of the varietal revolution which was to bring the susceptible P.O.J.2878 to a dominant position. The disease spread rapidly, and when roguing operations were commenced in 1938-39 over 11,000 diseased stools were dug out during the first year. The subsequent history of the disease is traced in Fig. 9. An increase in area inspected in 1939-1940 led to more than 13,000 diseased stools being found, but thereafter the roguing programme plus the control of the sources of planting material and the destruction of badly diseased blocks led to a big reduction in the amount of disease, and it would appear that the figures for the succeeding years represented, with seasonal variations, a mean which would remain of the same magnitude until the plantings of P.O.J.2878 decreased. The percentage of this cane in the total harvested in South Queensland is also given in Fig. 9. The important feature is that the disease could be and was kept under control by the measures adopted until a suitable resistant substitute for the valuable P.O.J.2878 had been found. The substitute variety, C.P.29/116, has proved an excellent cane and now yields over 60 per cent. of the South Queensland crop.

Two downy mildew resistance trials were planted in 1948. The one in North Queensland, however, had to be abandoned owing to a drought in the early stages. The other, which is on an isolated area in the Bundaberg district, was not entirely satisfactory owing to the variations in growth in the plot and unevenness of infection in the standard canes. However, some seedlings were found to be very susceptible, whilst it would appear that P.O.J.2727 is not so susceptible as P.O.J.2878.

Red Rot (*Phyalospora tucumanensis* Speg.).

The continued dry weather during the latter months of the 1948 harvest led to a good deal of red rot in the Mackay district and in the drier sections of the far north. The variety Q.50 at Mackay suffered severely and some of the crops cut late in the season failed to ratoon or ratooned very poorly as a result of the disease. Q.28 was not as severely affected as Q.50, an observation of particular interest since losses were heavy in Q.28 in the drought year of 1946 and any variety more susceptible than Q.28 would have to be watched carefully.

Although usually classified as a comparatively minor disease in the varieties commonly grown in South Queensland, red rot has undoubtedly been responsible for the discarding of the valuable Co.290. This variety, together with P.O.J.2878 and some less important canes, was used to replace the gumming-susceptible varieties which had suffered such losses in the serious epiphytotics of two decades ago and for some years produced very satisfactory crops. Within the last few years, however, red rot has become increasingly evident in the variety and was the most cogent reason for its rapid decline. In the Moreton area, for instance, nearly 800 acres were planted with Co.290 in 1944, and in 1945 the variety yielded more than half the crop; in 1948

only 24 acres were planted. It is suspected that there has been a change in the type of strain of the causal fungus over the years, as has been reported from Louisiana, and experimental culture work has been commenced on this aspect of the problem.

Germination Studies.

As recorded previously in these reports, the Inkerman area in the Lower Burdekin district suffers severely from poor germinations largely due to the invasion of the planted setts by the pineapple disease fungus (*Ceratostomella paradoxa*). Germinations are particularly bad when a prolonged wet season delays planting until late autumn or winter and the setts have to be planted in cold soil. The 1949 wet season did not finish as early as usual and farmers found themselves planting in the middle of May, approximately six weeks later than normal. Fortunately, however, the beneficial effect of dipping the setts into a mercurial solution prior to planting had already been proved in the area and the more far-sighted farmers dipped the plants for all their fields. Although a total of 140 tons had been treated in 1948, this season marked the first large-scale commercial application of the treatment and results have been uniformly excellent. Approximately 500 acres were initially planted after dipping and setts for a further 200 acres of replants were treated after the first undipped plantings had proved a failure. In addition, hundreds of tons of plants were dipped for supplying misses in untreated fields which had given poor germinations. Nearly 60 acres were treated on farms on the northern side of the River as well as many batches for supplies.

The methods used in handling the setts into and out of the solution varied considerably, but farmers are generally agreed that the more expensive plant built especially for the purpose is the most satisfactory and the cheapest in the long run. The simplest arrangement consists of a wire-netting and strap-iron basket, holding from one half to one bag of plants and manhandled into the solution. The special dipping equipment consists of a crane mounted on a frame with a large tank and capable of being moved from headland to headland as required. The dipping of whole planter-box loads by the use of detachable planter-boxes is practised by a few farmers, but special baskets with false bottoms and holding a full planter load are very satisfactory. Some of the plants cost more than £200, but quite efficient units are being manufactured at a cost of approximately £120. Even at the higher price the cost can readily be saved in a year of bad strikes on the average sized farm. The solutions used contain .015 per cent. mercury in an organic form and it appears that "Aretan," a mercurial developed for the dipping of potatoes and bulbs, is the most generally useful, although "Ceresan" and "Agrosan" have also given satisfactory results.

A study of the economics of the dipping procedure in planting say, 40 acres, reveals that, although extra labour is employed, the area planted per day is increased and the tonnage of plants per acre decreased. It is, in practice, actually cheaper to dip than not to, and a large advantage accrues through having uniform strikes, without the necessity for any costly supplying or replanting. This is a very important consideration in discussing dipping for areas where reasonably good germinations are the rule rather than the exception.

Pineapple disease was fairly widespread throughout North Queensland during 1949 and observations showed that Trojan and Q.50 were much more susceptible to the disease than Badila. One planting of Trojan of 30 acres and many smaller areas were virtual failures in the far north, and on the Burdekin the same variety was shown to be quite susceptible. The variety Q.50 is usually a rapid germinator, but the disease caused some failures at Mackay and was seen in association with insect damage to the buds in the Mulgrave area. The disease is not common in standing cane in Queensland, but a block of Badila in the Mulgrave area, so damaged by grubs that the sticks were pithy and nearly dead, showed it in many of the sticks examined. The particular interest in this lies in the fact that grub-damaged cane is very frequently used as plants, firstly, because it usually germinates well and, secondly, because it has ceased growth and will not increase in tonnage if left standing in the fields. It is obvious that the degree of deterioration of the damaged cane is important and care should be exercised in using this type of material for plants.

Investigational work undertaken during the year included a range of germination tests and the harvesting of several trials laid down in the previous season. A small trial in Brisbane showed that "Abavit S," a new mercurial submitted for test, was as effective as "Aretan" and "Ceresan" and all three were much superior to the untreated and to salicylanilide (.5 per cent.) and tetramethyl thiuram disulphide (.75 per cent.); an organic iodine compound at 1 per cent. concentration markedly depressed germination. A trial at Mackay yielded the interesting information that although pineapple disease was not present, the dipping of cut setts in a mercurial solution improved the germination in comparison with the dipping of the sticks before cutting into setts. It would appear, therefore, that there is no direct stimulation of the buds by the mercury (unless it be through the cut ends), and that probably the most important effect of the mercury is in preventing the invasion of the sett by soil-borne rotting organisms. It was impossible to persuade any Inkerman farmer in the area regularly suffering losses from poor germination to allow untreated plots to be included in a checker-board trial and so the expedient of a number of strip observational trials scattered throughout the district had to be adopted. Counts were then made on comparable sections of these strips. Some were concluded in spring, 1948, but final results from a wider range planted this year are not yet to hand. Current counts, however, indicate in this year of severe pineapple-disease infestation that the mercurial dip will provide complete protection and, even in areas where the disease is not usually a problem, it has ensured germinations

when the untreated setts have virtually failed. Fig. 12 shows a strip planted with mercurial-treated setts compared with adjacent rows of the same variety planted at the same time. Counts made when the photograph was taken, i.e., nine weeks after planting, averaged 21 shoots per 100 feet of row in the untreated and 69 in the treated; the photograph indicates that the difference in favour of the treated was greater than the counts show, due chiefly to the fact that many of the shoots in the untreated rows were then only just showing through the ground whereas virtually all in the treated rows were well up.

Harvest results of trials in Mackay and southern areas indicate that although dipping in a mercurial solution will significantly increase the total germination and the rate of germination in the absence of pineapple disease, the tonnage at harvest is not greater than in the untreated plots when conditions are suitable for the production of a better-than-average crop. The same conclusion may not hold for crops which are prevented from stooling at the correct time or which give a wider variation in germination than that encountered in these trials.

Miscellaneous.

For the first time since the reorganisation of the pathology staff of this Bureau in 1929 it can be recorded that gumming disease (*Xanthomonas vasculorum*) is not known to occur in commercial fields in Queensland. It would be premature to state that the disease has been eradicated since the last known diseased fields, which were in the Mossman area, were ploughed out only after harvest in 1948, and it is quite possible that a small focus of the disease may have persisted unnoticed there in some stools of a susceptible variety. Gumming resistance trials, however, will be continued and all new varieties coming into cultivation will be tested for their reaction to the disease. The resistance trial finalised in September, 1948, contained seedlings, standard canes of known reaction, and the varieties Pindar and Orion. Both Pindar and Orion proved resistant to the disease.

The other significant bacterial diseases, leaf scald (*X. albilineans*) and red stripe or top rot (*X. rubrilineans*), were not serious during the last season. Leaf scald, which now occurs only north of Townsville, is still important in the wetter areas, but even with the susceptible varieties, Trojan and Q.44, it appears that the disease can be kept under control by a rigid selection of planting material, usually from the higher, drier farms. This policy has been very effective in the Mulgrave mill area, but in some areas the true position as regards control will be revealed only by a poor season, owing to the masking of the disease when growing conditions are good. Some red stripe appeared in various parts of the sugar belt but generally did not develop into the more damaging top-rot stage. This was largely due to climatic influences, but on the Burdekin more adequate and uniform watering also played a part.

Pokkah boeng, due to the fungus *Fusarium moniliforme*, occurred in the northern areas with the first sudden flush of growth after the start of the wet season. Q.50 appeared to be more susceptible than other standard canes, but affected sticks nearly always quickly recovered and resumed normal growth.

With the prolonged dry conditions prevailing during the 1948 harvest in the Bundaberg district, the variety Q.49 proved readily susceptible to rind disease, *Plecocysta sacchari*, and as the season progressed appreciable stick losses, which were not confined to standover crops, were reported in Q.49 fields from all non-irrigated areas, particularly the Woongarra. Losses were confined in the main to this variety, though infection was also noted in some fields of P.O.J.2878 and Q.47 standover. The susceptibility of Q.49 has proved a serious threat to the future of this variety, and its planting scope appears limited to river-bank or irrigated farms.

Cultures for the inoculation of leguminous crops continue to be provided by this Division at a nominal charge of one shilling per planting. Orders were received from 101 farmers in all parts of the State and sufficient inoculum was dispatched for the treatment of 764 bushels of cowpeas, 4,310 lb. of Gambia pea (*Crotalaria goreensis*), 48 bushels of Mauritius beans and 215 lb. of lucerne seed.

The Bureau quarantine house, through which all importations of cane into Queensland must be made, was practically full this year. There were the Tuc. canes, 3950, 4535 and 4624, from Argentina, Co.331 from South Africa, P.O.J.2961 from Java, Co.475 and Co.617 from Coimbatore, India, and several seedlings from New South Wales. Setts of P.O.J.2364 from the United States of America had also been planted, but they failed to germinate. The Tuc. and Co. canes were not received until mid-summer and will therefore be kept in the house under observation for another growing season. Setts from the other varieties will be distributed to the various Experiment Stations in the coming spring for propagation and testing. Varieties sent out of the State included C.P.29/116 to New South Wales, Q.44 to the United States, H.Q.285, Q.2, S.J.2, S.J.4 and S.J.7 to Java and 28N.G.253, G.254, G.255, G.256 and G.257 to South Africa.

Report of the Division of Mill Technology.

By J. H. NICKLIN, Senior Technologist (Engineer), and J. L. CLAYTON, Senior Mill Technologist.

Routine Operations.

The Mutual Control scheme operated throughout the 1948 season, figures being contributed by 24 mills. Later, at the meeting of the Mill Research Programme Committee, held in Mackay in April, 1949, it was proposed to the mill representatives that, in order to eliminate considerable duplication of work, and delay in presentation of the figures, the mills should submit their returns with the relevant figures worked out for direct circulation. Distribution was to be weekly instead of fortnightly as in the past. The mills accepted these proposals and the scheme has operated successfully so far in the 1949 crushing season.

On the same occasion, it was proposed that the recording of Plant Data be divorced from the Mutual Control scheme, and that a separate publication, to be known as the Plant Data Record be compiled. All mills in the Mutual Control scheme and three others agreed to contribute to the Plant Data Record which is now in course of preparation.

Standardisation of laboratory apparatus was continued throughout the year. Tests were carried out on 148 brix spindles, 11 flasks, 9 polariscope tubes, 4 thermometers, 4 sets of weights, and 7 polariscopes. Three polariscopes were overhauled and checked. A saturation cell was designed and later tested on behalf of one mill. Sets of colour standards for pH determination were prepared and issued.

Newsletter No. 20 was devoted to the publication of the mill technology section of the report by Mr. J. L. Clayton on his visit to the Territory of Hawaii. This issue was circulated more widely than usual.

Seasonal Investigations.

The two main subjects of study during the 1948 season were vacuum pans and crystallizers. Pan tests were conducted at Inkerman and Pleystowe mills, and crystallizer tests at Moreton mill. The results of immediate interest were embodied in the papers by Messrs. Brain and Venton referred to on page 13. The information derived from these tests will be supplemented by further tests on allied subjects in 1949, and it is anticipated that material will then be available for a "Technical Communication" on low grade massecuite treatment.

All mills were visited at least once by a mill technologist during the season. In conjunction with these visits, Mr. Clayton delivered lectures in Innisfail, Ayr, and Mackay on sugar milling in Hawaii. A further lecture, in Bundaberg, is to be given during the 1949 season.

Slack Season Work.

Cane Wax.—The pilot plant for the extraction of cane wax from filter mud was operated at intervals throughout the year. A series of breakdowns and the need for alterations, coupled with long delays in having the work done, reduced the actual operating time far below anticipations. By the end of the slack season, it was decided that facilities at headquarters were inadequate for successful work with this plant, and arrangements have been made for the plant to be set up at a sugar factory. So far, it has been demonstrated that efficient operation is possible with the continuous extractor, but more data are required to enable a full scale plant to be designed.

The wax extracted has been forwarded to the Commonwealth Scientific and Industrial Research Organisation for use in a study of refining processes.

Handbook.—Information is being assembled for the compilation of a handbook for sugar chemists. This book will contain many formulae, tables, and charts and, it is hoped, will constitute a useful source of reference.

Bentonite.—A brief investigation of the influence of Australian bentonite (a colloidal clay) on clarification, in the laboratory, showed that this material is beneficial, but the minimum quantity required to yield measureable improvement was excessive on economic grounds. Further trials may show secondary gains which will reverse the economic balance.

Fuel Economy and Power Plant.

The Bureau was requested by several mills to offer suggestions regarding fuel economy and increase in power plant. In two cases fairly extensive reports were submitted by the Engineer Technologist in which a complete change of the existing system of electric power generation over to the standard Queensland system was recommended. Although such a drastic change may appear initially to be rather expensive (as is often the case with standardisation), no doubts are felt as to the ultimate economic gain and it is pleasing to note that the recommendations were adopted.

The majority of mills are tending to full electrification of all auxiliary drives and to meet the increased power demand steam turbo-alternators are generally favoured. The existing turbo sets in the industry have an excellent record as regards economy and reliability, with the result that eight units of this type ranging in size from 750 kW. to 2,000 kW. are now on order. The Bureau fully endorses this selection.

More care with switchboard and distribution planning is needed with the very heavy current output of these large sets, and here again the Bureau was able to give assistance. Complete switchboard drawings and specifications were submitted when requested and suggestions made regarding improved methods of distribution. In these cases the possibility of feeding back surplus power to the local Regional Electricity Board was not forgotten.

A suggestion covering the use of steam accumulators was made in a report to a South Queensland factory. These interesting items of plant are able to maintain practically constant pressure in both high and low pressure steam mains—an ideal condition which is approached in only a few Queensland factories. The three largest raw sugar factories in South Africa as well as the Durban refinery have installed steam accumulators. The Bureau wrote to two of the factories and the refinery asking for comments. Very helpful and informative replies were received and all three were rather enthusiastic about the performance of the units. In the report mentioned above the return to be obtained on the fairly high investment was shown to be quite good. The Bureau is hopeful that the installation will be made. It would be of benefit to the factory concerned in particular and to the Queensland industry in general as showing the possibilities of this type of plant.

For the purpose of calling tenders from district contractors, plans covering the well and pump installation for the Burdekin Experiment Station irrigation plant were drawn up and arrangements made for the purchase of various auxiliary items which will be installed by the contractor.

Working drawings of two laboratory instruments were made. These were subsequently manufactured quite successfully locally.

Factory Operations, 1948 Season.

The 1948 season was very favourable in all districts. The combination of a record crop with improved labour conditions in the field and the factory produced results satisfactory from the technical and economic points of view. It was unfortunate that the introduction of the 40-hour week caused undue prolongation of the crop period.

Reference to the Production Data set out in Table X. shows that both cane and sugar production figures were far above those recorded in recent years in each district. The State production figures of 6,433,556 tons of cane and 910,049 tons of 94 n.t. sugar are both records. The quality of the cane as shown was about average, but in this connection it must be recalled that the season was of abnormal length and therefore much of the cane could not be harvested at its peak of quality.

The molasses production for the season also rose to record heights, though the yield per ton of cane was not excessive in relation to the quality of the cane crushed.

Performance Figures.—Some performance data are set out in Tables XIII. and XIV. The rises in crushing rate over those of 1947 are most striking—77.63 to 81.22 tons per hour in the north, 61.39 to 68.74 in the central district, and 48.05 to 53.18 in the south. Since the figures for 1947 were all close to record height, the further rises are quite remarkable. Such performances were, no doubt, closely associated with the appreciable quantity of new equipment installed in the mills for the 1948 season. Nevertheless, most factories worked with the same milling plants as in the past, yet succeeded in maintaining satisfactory extraction figures. The pol extractions in the north and south areas were slightly below those of 1947, whilst the figure for the central district was actually above that of 1947.

The improved supply of field labour is reflected both in the higher crushing rates and also in the lower figure for lost time due to cane supply. The analysis of times is shown in Table XVII. In studying this table, it should be noted that the 40-hour week provided for a crushing time approximately 71.4 per cent. of the total time, with 28.6 per cent. idle time. Actually about half the mills worked overtime ranging up to a further 8 per cent. of the total time.

A study of the analysis of the final bagasse shows that the dry substance values were excellent in all districts, and distinctly superior to those of 1947. The reason why these did not lead to appreciably higher extractions is to be found in the higher figures for pol in bagasse. In this connection it is noted that the dilutions were low throughout and it would appear that many mills could not accommodate the usual degree of dilution at the higher rate of crushing.

As noted earlier, the yields of molasses per ton of cane were reasonable, though the figure of 5.47 gallons per ton of cane recorded for the central district (Table XIII.) was higher than the quality of the cane would suggest. The mud figures show a slight rise in pol, but the quantity was normal.

There was no appreciable change in the quality of the sugar produced during the 1948 season. A few mills exceeded the 99 degree limit to a slight extent, but in most cases the polarisations were within the 98.5-99 degree range. As usual in recent years, a considerable proportion of the sugar was subject to lengthy periods of storage at the mills and some instances of serious deterioration were recorded. In this connection the existence of the 99 degree limit of polarisation is most unfortunate as, in the interests of keeping quality, many chemists would prefer to manufacture sugar of the highest possible standard. In general, the northern sugars suffer the most deterioration as they contain the highest percentages of reducing sugars and moisture, and are stored under the least favourable atmospheric conditions.

In all districts the consumption of extraneous fuel was moderate and the figures for the southern area showed a great improvement over those of recent years. With very minor exceptions molasses was used for fuel only in the northern district, where the alternative demands for this material are not so pressing as in the south. The overall fuel consumption figures were slightly above average but not excessive.

In conclusion it may be stated that the 1948 season was something of a tonic to the industry. High production figures, continuity of process work, and improved equipment all pointed to a further stage of recovery from the difficult earlier years. At the present time the Queensland sugar industry is involved in an extensive programme of reconstruction, partly as a result of the wartime austerity and partly to cope with new labour conditions and the prospect of increased production. A disastrous season at this time could seriously hamper this work and perhaps cripple some mills financially. It is to be hoped that the 1949 season will maintain the high standard set in 1948.

TABLE X.—PRODUCTION DATA FOR THE QUEENSLAND SUGAR INDUSTRY FOR THE SEASONS 1941 to 1947, INCLUSIVE. (TOTALS AND WEIGHTED AVERAGES.)

NORTHERN DISTRICT.*

	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Cane—							
Tons	1,963,175	1,430,006	1,819,552	1,943,613	1,551,959	1,876,137	2,478,083
Pol per cent.	15.06	16.10	15.69	15.56	16.68	14.81	15.55
Fibre per cent.	9.89	10.62	10.39	10.51	10.57	10.62	10.55
C.C.S.	13.93	14.99	14.64	14.47	15.54	13.66	14.39
Purity first expressed juice	89.00	89.95	90.38	89.75	90.08	88.60	89.24
Sugar—							
Tons (94 net titre)	263,908	206,634	259,573	281,998	233,732	255,958	356,969
Cane per ton sugar	7.44	6.92	7.01	6.89	6.64	7.33	6.94
Pol per cent.	98.59	98.58	98.67	98.59	98.70	98.48	98.60
Net titre	97.20	97.14	97.42	97.26	97.45	96.91	97.24
Dilution indicator	33.81	32.31	28.50	31.44	28.90	33.00	30.00
Pol per cent. pol cane	86.43	86.07	86.49	86.72	85.65	84.89	86.60
Mud—							
Tons	34,864	23,045	32,285	31,614	26,009	33,152	37,485
Mud per cent. cane	3.01	2.58	2.98	2.93	3.04	2.85	2.67
Pol per cent.	4.32	4.08	4.75	4.57	3.80	3.41	3.93
Pol per cent. pol cane	0.86	0.65	0.90	0.86	0.69	0.66	.67
Molasses—							
Gallons	4,816,269	3,738,134	4,174,420	4,415,061	3,979,612	5,065,600	6,087,150
Gallons per ton cane	4.16	4.19	3.86	4.09	4.66	4.36	4.33
Brix	85.05	84.91	84.71	87.14	85.92	86.74	86.40
Apparent purity	32.85	35.01	35.83	35.32	36.18	32.41	33.01
True purity	47.41	47.73	48.25	47.80	48.92	..	46.47
Reducing sugars	17.31	16.35	14.72	16.56	14.88	17.50	18.28
Pol per cent. pol cane	4.98	4.99	4.81	5.28	5.52	5.35	5.23
Final Bagasse—							
Tons	240,685	197,909	235,132	234,022	194,494	258,536	308,282
Bagasse per cent. cane	20.68	22.01	21.72	21.68	22.75	22.34	21.93
Pol per cent.	2.67	2.83	2.79	2.72	3.03	2.45	2.86
Dry substance	51.34	51.77	51.45	51.62	50.40	51.04	51.70
Pol per cent. pol cane	3.69	3.90	3.87	3.79	4.13	3.68	4.04
Undetermined loss—							
Pol per cent. pol cane	4.04	4.39	3.93	3.35	4.01	5.42	3.46
Fuels—							
Tons wood	8,433	6,936	6,353	11,143	10,291	7,389	5,378
Tons coal	..	..	..	..	..	16.00	..
Tons molasses	16,908	12,539	12,144	9,951	5,232	9,057	10,691

* The figures for tons of cane, tons of sugar, and tons of cane per ton of sugar refer to all mills. All others exclude C.S.R. Co. mills.

CENTRAL DISTRICT.†

	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Cane—							
Tons	1,631,976	1,176,802	1,700,451	1,699,803	1,716,764	1,380,368	2,572,089
Pol per cent.	16.14	16.58	16.87	15.83	15.21	16.44	15.98
Fibre per cent.	11.22	11.95	12.07	12.34	11.34	12.16	12.67
C.C.S.	15.17	15.56	15.81	14.79	13.69	15.36	14.76
Purity first expressed juice	91.40	91.19	90.98	90.48	85.64	90.59	88.85
Sugar—							
Tons (94 net titre)	240,458	177,527	262,254	242,673	227,754	204,780	373,003
Cane per ton sugar	6.79	6.63	6.48	7.00	7.54	6.74	6.90
Pol per cent.	98.74	98.80	98.91	98.93	98.87	98.91	98.83
Net titre	97.36	97.52	97.77	97.80	97.63	97.57	97.62
Dilution indicator	31.78	29.35	26.95	24.58	27.16	30.00	28.00
Pol per cent. pol cane	87.03	86.65	86.94	85.75	82.96	85.94	86.46
Mud—							
Tons	66,194	47,653	66,339	64,449	70,807	49,767	83,008
Mud per cent. cane	4.06	4.05	3.91	3.79	4.12	3.61	3.23
Pol per cent.	1.89	1.80	1.85	1.78	2.15	1.88	2.27
Pol per cent. pol cane	0.47	0.44	0.43	0.43	0.58	0.41	0.46
Molasses—							
Gallons	6,269,265	4,773,416	7,474,610	7,902,266	11,146,914	6,777,400	13,828,230
Gallons per ton cane	3.84	4.06	4.40	4.65	6.69	4.91	5.38
Brix	86.81	88.15	87.36	87.46	88.02	88.32	88.83
Apparent purity	38.10	37.11	37.36	38.99	34.44	37.69	35.40
True purity	47.00	46.40	47.20	48.71	45.68	..	46.56
Reducing sugars	13.02	14.68	14.34	13.54	23.81	14.57	17.30
Pol per cent. pol cane	5.12	5.24	5.55	6.54	8.44	6.51	7.05
Final bagasse—							
Tons	418,048	303,907	435,253	437,701	426,219	344,687	657,839
Bagasse per cent. cane	25.62	25.82	25.60	25.75	24.82	24.97	25.58
Pol per cent.	2.76	2.93	2.91	2.67	3.03	2.62	2.58
Dry substance	49.42	49.42	50.22	51.43	49.71	52.14	52.99
Pol per cent. pol cane	4.38	4.56	4.42	4.34	4.94	3.97	4.12
Undetermined loss—							
Pol per cent. pol cane	3.00	3.11	2.66	2.94	3.08	3.17	1.91
Fuels—							
Tons wood	6,936	10,759	11,422	7,240	15,322	4,988	9,315
Tons coal	171	559	642	514	637	271	244
Tons molasses	1,024	886	1,152	1,299	1,083	..	40

† The fuel figures exclude Pioneer and Inkerman mills. All others include all mills.

TABLE X.—continued.

SOUTHERN DISTRICT.

	1942.	1943.	1944.	1945.*	1946.†	1947.	1948.
Cane—							
Tons	755,491	790,616	878,187	908,566	445,752	894,482	1,383,384
Pol per cent.	14.96	14.42	15.35	14.84	13.23	14.31	14.58
Fibre per cent.	13.85	13.64	13.39	13.97	13.47	14.68	14.23
C.C.S.	13.73	13.26	14.20	13.63	11.54	13.01	13.28
Purity first expressed juice ..	88.01	88.18	89.15	88.17	81.18	88.05	86.95
Sugar—							
Tons (94 net titre)	101,314	102,286	121,713	119,918	50,600	110,920	180,077
Cane per ton sugar	7.46	7.73	7.22	7.58	8.81	8.07	7.68
Pol per cent.	98.86	98.90	99.08	99.09	98.72	99.06	99.10
Net titre	97.39	97.56	97.92	97.95	97.02	96.96	97.96
Dilution indicator	31.15	29.11	26.13	27.79	26.73	25.00	28.00
Pol per cent. pol cane	85.53	85.49	85.90	86.33	81.99	83.86	85.04
Mud—							
Tons	26,669	32,969	31,966	34,716	15,601	30,515	40,951
Mud per cent. cane	3.53	4.17	3.64	3.90	3.69	3.39	3.10
Pol per cent.	2.69	2.19	2.50	3.59	3.20	2.55	3.10
Pol per cent. pol cane	0.63	0.63	0.59	0.94	0.89	0.61	.65
Molasses—							
Gallons	3,641,467	3,541,960	3,837,677	4,139,049	3,204,205	4,506,000	7,242,457
Gallons per ton cane	4.82	4.48	4.37	4.56	7.14	5.13	5.25
Brix	89.29	88.82	89.19	88.62	88.06	88.58	89.47
Apparent purity	38.39	39.71	38.72	39.15	34.60	38.70	37.40
True purity	46.32	47.38	46.98	47.20	45.04	..	46.39
Reducing sugars	12.06	10.06	11.21	11.08	19.59	13.05	15.35
Pol per cent. pol cane	7.27	7.20	6.47	7.13	11.04	7.85	7.93
Final bagasse—							
Tons	215,800	225,235	243,681	267,213	126,496	257,705	397,317
Bagasse per cent. cane	28.56	28.55	27.71	29.41	29.20	29.22	29.02
Pol per cent.	2.22	2.03	2.14	2.17	2.14	1.94	2.02
Dry substance	51.43	50.51	51.15	50.20	49.41	51.07	51.98
Pol per cent. pol cane	4.24	4.01	3.87	4.39	4.38	3.87	4.01
Undetermined loss—							
Pol per cent. pol cane	2.33	2.67	3.17	1.21	1.70	3.81	2.37
Fuels—							
Tons wood	7,418	15,339	11,044	10,351	9,532	4,421	5,925
Tons coal	504	1,083	602	411	1,001	513	77
Tons molasses	..	..	..	..	..	..	..

* In 1945, mud figures exclude Rocky Point and Fuel figures exclude Maryborough.

† In 1946, Mount Bauple is excluded from Mud and Fuel figures and Rocky Point from all except Tons Cane, Tons Sugar, Tons Cane per ton Sugar and Fuel figures.

ALL QUEENSLAND DISTRICTS.

	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Cane—							
Tons	4,350,642	3,397,424	4,398,190	4,551,982	3,714,475	4,150,987	6,433,556
Pol per cent.	15.51	15.80	16.15	15.51	15.33	15.34	15.51
Fibre per cent.	11.71	12.02	11.90	12.21	11.44	12.28	12.51
C.C.S.	14.43	14.72	15.07	14.41	13.89	14.18	14.28
Purity first expressed juice ..	89.80	89.93	90.35	89.70	86.23	89.26	88.47
Sugar—							
Tons (94 net titre)	605,680	486,447	643,540	644,661	512,086	571,658	910,049
Cane per ton sugar	7.18	6.98	6.83	7.06	7.25	7.26	7.23
Pol per cent.	98.71	98.76	98.88	98.86	98.80	98.81	98.83
Net titre	97.31	97.30	97.70	97.67	97.36	97.50	97.60
Dilution indicator	32.16	31.67	27.34	27.75	27.66	30.00	29.00
Pol per cent. pol cane	86.53	86.17	86.57	86.17	83.67	85.11	86.16
Mud—							
Tons	127,727	103,667	130,590	130,779	112,417	113,434	161,444
Mud per cent. cane	3.60	3.63	3.57	3.56	3.75	3.31	3.02
Pol per cent.	2.72	2.70	2.78	2.93	2.68	2.51	2.86
Pol per cent. pol cane	0.63	0.56	0.60	0.67	0.66	0.54	.56
Molasses—							
Gallons	14,727,001	12,053,510	15,486,707	16,456,376	18,330,731	16,349,000	27,157,837
Gallons per ton cane	4.15	4.22	4.23	4.46	6.07	4.78	5.07
Brix	86.85	87.34	87.10	87.67	87.58	87.91	88.46
Apparent purity	36.45	37.22	37.28	38.05	34.84	36.35	35.40
True purity	46.97	47.10	47.43	48.09	46.26	..	46.49
Reducing sugars	14.19	13.84	13.77	13.73	21.18	15.17	16.95
Pol per cent. pol cane	5.51	5.65	5.55	6.30	7.85	6.45	6.78
Final bagasse—							
Tons	874,553	727,051	914,066	938,936	747,209	860,928	1,363,438
Bagasse per cent. cane	24.67	25.43	24.97	25.46	24.86	25.16	25.50
Pol per cent.	2.62	2.67	2.75	2.54	2.87	2.36	2.48
Dry substance	50.46	50.57	50.80	51.13	49.86	51.49	52.41
Pol per cent. pol cane	4.13	4.21	4.13	4.17	4.62	3.85	4.07
Undetermined loss—							
Pol per cent. pol cane	3.20	3.41	3.15	2.69	3.20	4.05	2.43
Fuels—							
Tons wood	22,787	33,034	28,819	28,734	35,145	16,798	20,618
Tons coal	741	1,642	1,244	925	1,638	800	321
Tons molasses	17,932	13,425	13,296	11,250	6,315	9,057	10,731

Tons of Cane, Tons Sugar, and Tons Cane per ton Sugar include all mills. All other figures exclude C.S.R. Mills only, except—

(1) In 1945, Mud figures exclude Rocky Point and Fuel figures exclude Maryborough.

(2) In 1946, Mount Bauple is excluded from Mud and Fuel figures and Rocky Point from all except Ton Cane, Sugar, Tons Cane per ton Sugar and Fuel figures.

(3) All years Fuel figures exclude Pioneer and Inkerman.

TABLE XI.—SUGAR PRODUCED 1948, COMPARED IN DISTRICTS WITH PEAK ALLOCATIONS.

District.								Tons 94 net titre Sugar.			Production Per Cent. Peak.
								Produced.†	Peak.	Excess of Production Over Peak.	
Northern	..	..	..	..	..	..	..	356,969	330,000	26,969	108·17
Central	..	..	..	..	..	..	..	373,003	270,000	103,003	138·15
Southern	..	..	..	..	..	..	..	180,007	137,000	43,077	131·44
All Districts	..	..	..	..	..	..	..	910,049	737,000	170,049	123·48

† Including Local Sales.

TABLE XII.—TONS CANE PER TON 94 NET TITRE SUGAR (WEIGHTED AVERAGE).

Season.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Tons cane per ton 94 n.t. sugar	6·77	6·82	6·87	7·18	6·98	6·83	7·06	7·25	7·26	7·07

TABLE XIII.—FIGURES FOR 1948 SEASON. (TOTALS AND ARITHMETIC AVERAGES.)

	Northern.	Central.	Southern.	All Districts.
Tons cane crushed	2,478,083	2,572,089	1,383,384	6,433,556
Tons 94 n.t. sugar made	356,969	373,003	180,007	910,049
Net titre of sugar	97·24	97·59	97·15	97·33
Tons cane per ton sugar	6·97	6·91	7·95	7·25
C.C.S. of cane	14·42	14·77	13·60	14·30
Coefficient of work	97·97	98·12	96·55	97·56
Coefficient of work E.S.G.	92·96	93·20	91·66	92·63
Crushing rate	81·22	68·74	53·18	68·88
Lost time per cent.	8·48	6·76	6·84	7·44
Fibre per cent. cane	10·55	12·73	14·32	12·78
Pol per cent. cane	15·58	15·99	14·72	15·48
First expressed juice—				
Brix	20·65	22·01	20·94	21·35
Purity	89·28	88·77	87·16	88·35
Clarified juice—				
Brix	16·66	16·04	15·37	15·95
Purity	88·88	86·70	86·65	87·20
Syrup—				
Brix	69·65	70·76	67·05	69·16
Purity	88·86	86·90	86·87	87·36
Last expressed juice—				
Purity	78·43	75·89	76·67	76·71
Clarified juice per cent. cane	100·00	110·00	105·00	106·00
Dilution per cent. first expressed juice	23·99	37·47	36·52	33·89
Final bagasse—				
Pol	2·89	2·59	2·30	2·56
Dry substance	51·93	53·04	52·01	52·45
Pol extraction	95·96	95·88	95·40	95·74
Reduced extraction	95·09	95·93	96·07	95·78
Final molasses—				
Gallons per ton cane	4·38	5·47	5·16	5·13
Brix	86·14	88·63	87·02	87·54
Apparent purity	33·30	35·67	37·68	35·81
True purity	46·86	46·67	46·64	46·70
Reducing sugars	18·39	17·40	15·36	15·88
Final mud—				
Tons per cent. cane	2·68	3·18	2·93	2·98
Pol per cent. mud	4·07	2·56	3·78	3·30
Sugar—				
Pol	98·603	98·857	98·755	98·766
Reducing sugars	·462	·373	·256	·350
Ash	·180	·178	·270	·211
Moisture	·326	·255	·299	·286
Dilution indicator	31·00	28·00	30·00	29·00
Pol balance—				
Sugar (recovery)	86·43	86·32	83·82	85·51
Bagasse	4·04	4·12	4·60	4·26
Molasses	5·30	7·09	7·72	6·90
Mud	0·66	0·47	0·64	0·57
Undetermined Loss	3·57	2·00	3·22	2·76
Boiling house efficiency	94·50	94·94	93·62	94·40
Boiling house efficiency E.S.G.	94·10	94·62	93·32	94·07
Fuels (calculated as equivalent bagasse per cent. cane)—				
Wood	·672	1·617	1·977	1·519
Coal	·000	·037	·009	·018
Molasses	1·535	·002	·012	·374
Total added fuel	2·207	1·656	1·998	1·911
Bagasse	23·063	28·497	31·010	28·098
Total fuel	25·270	30·153	33·008	30·009
Crop days	1,938·4	2,217·3	1,551·9	5,707·6

TABLE XIV.—AVERAGE PERFORMANCE FOR QUEENSLAND FACTORIES, EXCLUDING C.S.R. COY.'S FACTORIES.
(ARITHMETIC AVERAGES.)

	Northern District.		Central District.		Southern District.		All Districts.	
	1947.	1948.	1947.	1948.	1947.	1948.	1947.	1948.
Cane—								
Pol	14.82	15.58	16.46	15.99	14.20	14.72	15.30	15.48
Fibre	10.65	10.55	12.61	12.73	14.09	14.32	12.72	12.78
Purities—								
First expressed juice	88.57	89.28	90.41	88.77	86.83	87.16	88.81	88.35
Clarified juice	88.20	88.88	88.40	86.70	86.29	86.65	87.59	87.20
Syrup	88.21	88.86	88.34	86.90	86.44	86.87	87.61	87.36
Gallons molasses per ton cane	4.47	4.38	5.19	5.47	5.32	5.16	4.78	5.13
Apparent purity molasses	32.75	33.30	38.26	35.67	39.37	37.68	37.41	35.81
Overall recovery	85.77	86.31	84.76	86.42	82.89	84.06	84.37	85.61
Overall recovery E.S.G.	85.43	85.95	84.42	86.13	82.62	83.80	84.04	85.31
Recovery on mixed juice	89.02	89.96	88.41	90.13	86.65	88.01	88.00	89.38
Recovery on mixed juice E.S.G.	88.66	89.57	88.29	89.83	86.39	87.73	87.73	89.07
Boiling house efficiency	93.87	94.50	92.42	94.94	92.17	93.62	92.66	94.40
Boiling house efficiency E.S.G.	93.49	94.10	92.12	94.62	91.87	93.32	92.34	94.07
Pol extraction	96.35	95.96	95.77	95.88	95.65	95.40	95.86	95.74
Reduced extraction	95.58	95.09	95.81	95.93	96.24	96.07	95.90	95.78
C.C.S. in cane	13.37	14.42	15.37	14.77	12.93	13.60	14.13	14.30
Coefficient of work	97.53	97.97	95.35	98.12	94.30	96.55	95.44	97.56
Coefficient of work E.S.G.	91.57	92.96	90.51	93.20	90.00	91.66	90.56	92.63

TABLE XV.—CANE MILLED AND SUGAR YIELDED, 1948.

Mills.	Tons Cane Crushed.	Tons 94 n.t. Sugar Made.	Tons Cane per Ton 94 n.t. Sugar.	
			1948.	1947.
Mossman	157,088	22,019	7.134	7.899
Hambledon	244,449	36,193	6.754	7.252
Mulgrave	293,157	41,283	7.101	7.694
Babinda	238,416	33,122	7.198	7.547
Goondi	204,228	28,340	7.206	7.498
South Johnstone	266,836	37,776	7.064	7.257
Mourilyan	182,528	25,808	7.073	7.355
Tully	267,594	38,651	6.923	7.305
Victoria	327,566	48,751	6.719	6.901
Macknade	296,221	45,005	6.582	6.873
Local sales	..	21	..	..
Northern District, Totals and averages	2,478,083	356,969	6.942	7.330
Invicta	145,517	22,291	6.528	6.578
Pioneer	225,941	34,491	6.551	6.527
Kalamia	241,106	37,138	6.492	6.231
Inkerman	292,346	42,594	6.864	6.795
Proserpine	257,420	36,490	7.055	6.905
Cattle Creek	91,644	13,032	7.032	7.045
Racecourse	258,122	36,600	7.053	7.161
Farleigh	244,629	35,288	6.932	7.223
North Eton	102,826	14,308	7.187	6.831
Marian	226,433	32,372	6.995	6.822
Pleystowe	254,957	35,601	7.162	6.885
Plane Creek	231,148	32,701	7.069	7.019
Local sales	..	97	..	..
Central District, Totals and averages	2,572,089	373,003	6.896	6.744
Qunaba	113,503	14,036	8.087	8.949
Millaquin	250,431	33,499	7.476	8.204
Bingera	251,687	33,550	7.502	7.863
Fairymead	262,085	33,345	7.860	8.323
Gin Gin	66,091	8,208	8.052	8.298
Isis	219,656	28,917	7.596	7.641
Maryborough	68,199	9,292	7.340	7.730
Mount Bauple	33,998	4,237	8.024	8.302
Moreton	103,477	13,517	7.655	7.693
Rocky Point	14,257	1,441	9.894	9.375
Local sales	..	35	..	..
Southern District, Totals and averages	1,383,384	180,077	7.682	8.069
All Districts, Totals and averages	6,433,556	910,049	7.069	7.264

TABLE XVI.—AVERAGE CRUSHING RATES: 1939-1948, EXCLUDING C.S.R.COY'S MILLS AND ROCKY PT.
(ARITHMETIC AVERAGES).

Season.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Tons Cane per Hour	61.53	61.67	63.32	55.93	55.45	57.33	59.32	59.48	60.55	68.88

TOTAL CROP DAYS 1939-1948.

Season.	1939.	1940.	1941.	1942.	1943.	1944.	1945.	1946.	1947.	1948.
Total crop days ..	5,163	4,558	4,034	4,432	4,270	4,749	4,872	3,740	4,289	5,708

TABLE XVII.—ANALYSIS OF GROSS TIME FOR SEASON 1948 (EXCLUDING C.S.R. MILLS).

	Total Hours.	Per cent. of Gross Total Hours.	Per cent. of Available Hours.
Crushing time	78,762.1	67.31	93.26
Lost time—			
Manufacture	3,480.8	2.98	4.12
Cane supply	2,216.6	1.89	2.62
Total available hours	84,459.5	72.18	100.00
Premeditated stops and week-ends	32,547.2	27.82	..
Gross total hours	117,006.7	100.00	..

TABLE XVIII.—FUEL CALCULATED AS EQUIVALENT BAGASSE* PER 100 CANE. (ARITHMETIC AVERAGES.)

Year.	Wood.	Coal, &c.	Molasses.	Total Added.	Bagasse.	Total.
NORTHERN DISTRICT.						
1939	.557	..	1.807	2.364	21.892	24.256
1940	1.226	..	1.217	2.443	21.982	24.425
1941	1.230	..	.768	1.998	21.390	23.388
1942	1.243	..	2.276	3.519	21.637	25.156
1943	1.410	..	2.224	3.634	23.182	26.816
1944	1.063	..	1.770	2.833	22.633	25.466
1945	1.830	..	1.552	3.382	23.021	26.403
1946	2.287	..	1.088	3.375	22.858	26.233
1947	1.167	.005	.913	2.085	22.988	25.073
1948	.672	..	1.535	2.207	23.063	25.270
CENTRAL DISTRICT.						
1939	.993	.058	.646	1.697	24.743	26.440
1940	1.138	.019	.220	1.377	24.801	26.178
1941	1.106	.047	.295	1.448	24.837	26.285
1942	1.224	.046	.217	1.487	26.254	27.741
1943	2.589	.189	.198	2.976	26.163	29.139
1944	1.995	.131	.180	2.306	27.061	29.367
1945	1.372	.092	.326	1.790	28.144	29.934
1946	2.730	.132	.132	2.994	25.183	28.177
1947	1.487	.025	.019	1.531	28.068	29.599
1948	1.617	.037	.002	1.656	28.497	30.153
SOUTHERN DISTRICT.						
1939	2.714	.010	..	2.724	30.011	32.735
1940	2.535	.031	.005	2.571	29.341	31.912
1941	2.659	.045	..	2.704	28.612	31.316
1942	3.197	.183	..	3.380	30.325	33.705
1943	5.385	.380	..	5.765	29.358	35.123
1944	4.306	.151	..	4.457	29.326	33.783
1945	3.565	.059	..	3.624	30.550	34.174
1946	5.693	.697	..	6.390	29.341	35.731
1947	3.785	.141	..	3.926	30.388	34.314
1948	1.977	.009	.012	1.998	31.010	33.008
ALL QUEENSLAND DISTRICTS.						
1939	1.508	.027	.692	2.227	25.956	28.183
1940	1.662	.018	.382	2.062	25.759	27.821
1941	1.695	.035	.302	2.032	25.369	27.401
1942	1.939	.084	.633	2.656	26.612	29.268
1943	3.313	.212	.613	4.138	26.598	30.736
1944	2.603	.107	.497	3.207	26.814	30.021
1945	2.218	.058	.524	2.800	27.781	30.581
1946	3.516	.270	.341	4.127	25.842	29.969
1947	2.238	.062	.226	2.526	27.684	30.210
1948	1.519	.018	.374	1.911	28.098	30.009

* Equivalent bagasse = bagasse with net calorific value of 3,300 B.Th.U. per lb.

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